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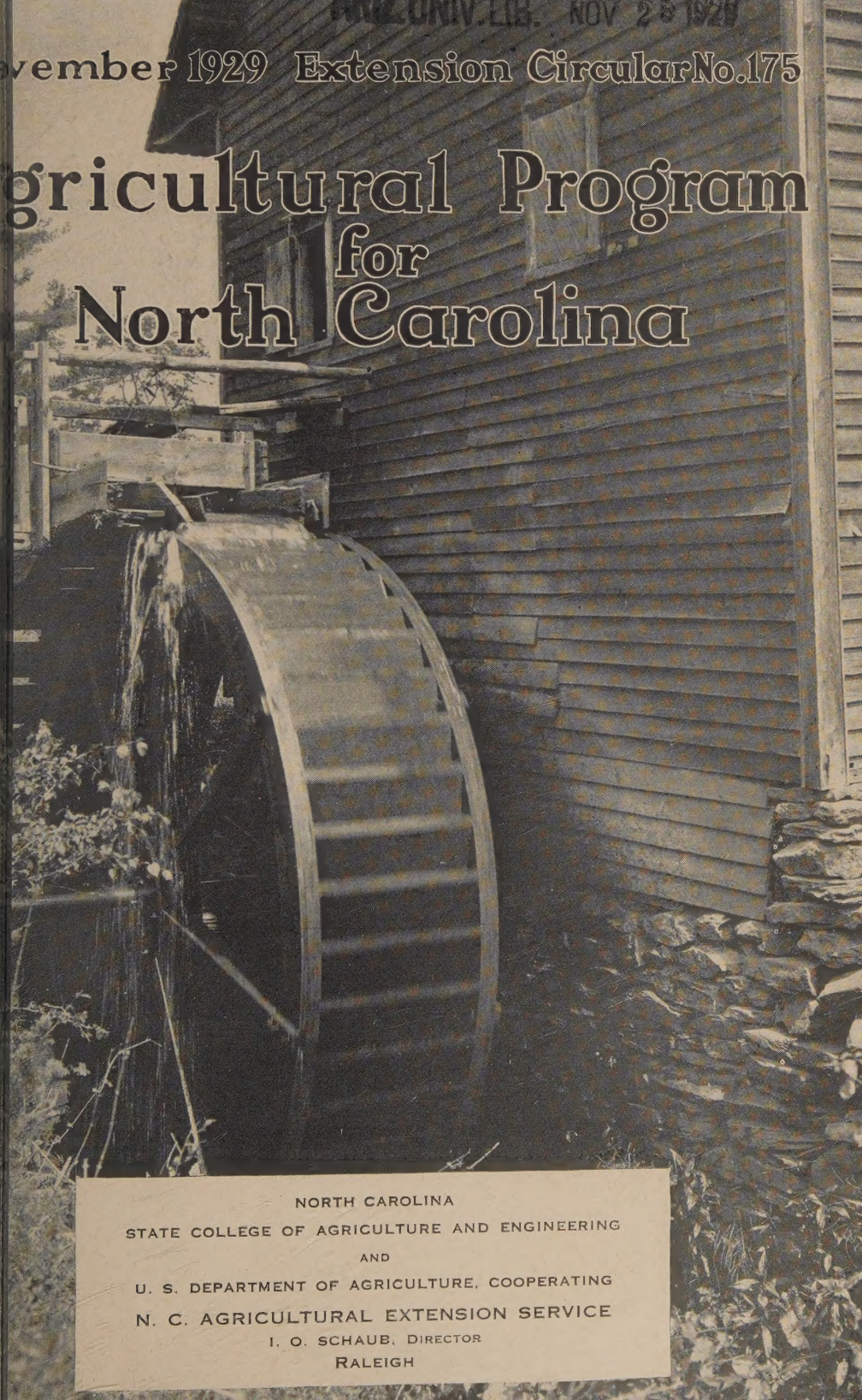
gricultural Program for North Carolina



NORTH CAROLINA
STATE COLLEGE OF AGRICULTURE AND ENGINEERING
AND
U. S. DEPARTMENT OF AGRICULTURE, COOPERATING
N. C. AGRICULTURAL EXTENSION SERVICE
I. O. SCHAUB, DIRECTOR
RALEIGH

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AN AGRICULTURAL PROGRAM FOR NORTH CAROLINA

Adopted by State Agricultural Leaders
State Farmers' and Farm Women's Convention
July 22-26, 1929

INTRODUCTION

For years agricultural leaders believed that facts alone would solve our agricultural problems. Experience has proved, however, that farmers are not able to make the greatest use of technical and economic facts unless assisted in some definite way. The principal reason for making an Agricultural Program is to present in a concrete form the chief problems of the State and to offer suggestions for their solution.

The adoption of a farm program in any county or community depends first on the selection of a strong central committee

There are several reasons why such a program is necessary at this time.

First: Farming is a business as well as a mode of living. Farmers produce not only for their own needs but for the market. The various markets to which their products are sent are diverse including local, domestic and foreign. The problem of producing for these markets is so difficult and the information needed so extensive that individual and isolated farmers cannot hope to solve this problem unassisted.

Second: Unlike many commercial and industrial enterprises the economic unit of farming is small. For this reason farmers, as a rule, cannot afford to employ experts to advise them with respect to the products to be produced and the methods of production and marketing, which is a common practice among the larger and more successful commercial and industrial corporations. The grower needs, therefore, the coöperation of the state in assisting him to produce what the market demands and information about how the products may be produced and marketed at the least cost.

Third: Because the economic unit of farming is small and for other reasons the farmer is apparently losing out in the *race for wealth.* In recent years, the farmers have been contributing more to national income than they have received. Agriculture needs, therefore, the interference and participation of the State in a very definite manner in order to preserve an independent class which has heretofore been looked upon as being valuable to American civilization. It should be apparent to all that a prosperous, independent class of farmers is of mutual benefit to all classes of society.

At the instigation of His Excellency, O. Max Gardner, North Carolina's Agricultural Governor, a conference of agricultural leaders was called in January 1929 to discuss ways and means of improving farming conditions and rural life in North Carolina. At this conference the advisory committee decided that a long time agricultural program for North Carolina should be issued. The agricultural staff of the North Carolina State College was asked to prepare this program and to secure the assistance and suggestions of a committee of the state's most successful farmers.

One hundred and fifty-eight farmers, representing 68 North Carolina counties, came to Raleigh on official invitation from the Governor and were assigned to work on departmental programs. Representatives from the Agricultural Committee of the State Bankers Association, Fertilizer Companies, Farm Machinery manufacturers and other business interests assisted with and contributed to the program herewith submitted.

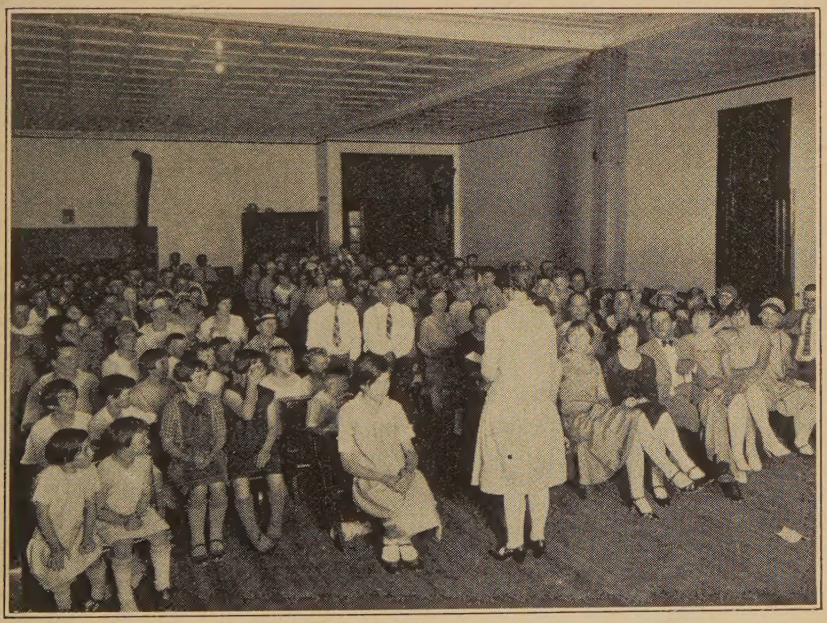
This program marks the beginning of an effort to more thoroughly coordinate and put into effect a long time agricultural program which will be carried to all counties of the State. The Agricultural Extension Service through County and Home Agents, Vocational Teachers, County Agricultural Advisory Boards and other agencies, will work out and put into force definite county programs that will include many features of the State program applicable to the various communities in the counties. The committee intends to study the progress made yearly and when the need arises will revise this program and make it more detailed and helpful for the future.

DESCRIPTION OF STATE FROM THE STANDPOINT OF AN AGRICULTURAL PROGRAM

North Carolina is distinctly divided into four regions. The first is a high mountain plateau; the second, a hill country known as the Piedmont; the third, a large plain called the Coastal Plain; the fourth, extending from the head of the tides downward to the coast, is the Tidewater region. The State is one vast slope from the Smoky Mountains to the sea. From the mountains to the Piedmont there is a sharp descent, through a few miles of

nearly 1,500 feet; from the Piedmont to the Coastal Plain, a descent of about 200 feet; through the Coastal Plain and Tidewater there is a constant downward grade.

Topography and Soils. The Mountain region contains the highest summits of the Appalachian system. In all, there are 82 mountains which exceed 5,000 feet. The general contour of these mountains is gentle, the summits presenting smooth rounded outlines, occasionally rising into sharp pointed peaks, and presenting but few precipitous and rocky slopes. The mountains are covered with deep, rich soil, and clothed with forests to their tops. Porters loam and Cecil clay loam soils predominate. The soils of the mountain valleys and coves are noted for their fertility. The capacity for the production of grain, hays, fruits and vegetables is equal to that of any section in the State.



Community meetings like this in Stanly County are essential to a full understanding of any agricultural program

The Piedmont region presents a gentle rolling appearance, with here and there isolated ranges of hills in the vicinity of the larger streams. The elevation ranges from 500 to 2,000 feet. This area is intersected by numerous small streams. Along the Catawba and Yadkin rivers are extensive tracts of lowlands which were formerly considered the most productive lands, but in recent years these lands have been damaged by deposits of sand and clay washed from the hills. Throughout the region the problem of soil erosion on the hill farms is a serious one. Cecil clay loam, and Cecil sandy loam, are the chief soil types. The heavy clay soils hold their fertility well and are susceptible of improvement. They are well

adapted to general farming. Grain, hay crops and cotton produce fair yields.

In the Coastal Plain are tracts of country which vary little from a perfect level. From east to west the surface rises at an average rate of one foot per mile. Though level in places, it is relieved by slight undulations and low, rolling hills along the western border. The average elevation ranges from 30 to 80 feet in the east to the hills of Moore County, which in places, attain a height of 500 feet above sea level. Although varied in character, the principal upland soil types are Norfolk sandy loam and Norfolk sand. These soils produce fine yields of tobacco, cotton, corn, peanuts, soybeans, and all other staple crops of the area. The Coastal Plain is the richest potential agricultural area in North Carolina. Broad, level fields, invite the use of modern machinery and approved methods of farming.

The Tidewater region is almost level. The average elevation is only a few feet above sea level, while the highest points are only 30 to 50 feet above the surrounding country. The coast line is marked by many deep indentations forming the outlets of broad and shallow rivers and sounds. There are many large swamps and great stretches of salt marshes along the coast. The alluvial lands of this section are productive and of unusual extent and importance. The soils of the Tidewater have a wide range in texture and structure, and are adapted to a varied list of crops. Most of the upland soils are Norfolk sandy loam, Portsmouth loam, and Coxville silt loam. The sandy loam uplands constitute the best all-round agricultural soils of the section.

Climate. The cool bracing air, together with its varied scenery, make the Mountain region a favorite resort in the summer. The extremes in temperature between summer and winter are considerable. The average mean temperature for the year is 55 degrees F. The precipitation varies widely for different parts of the region. In some sections there is considerable snowfall in the winter. The average annual precipitation is 59.8 inches. The growing season averages six months, and there is pasturage much longer.

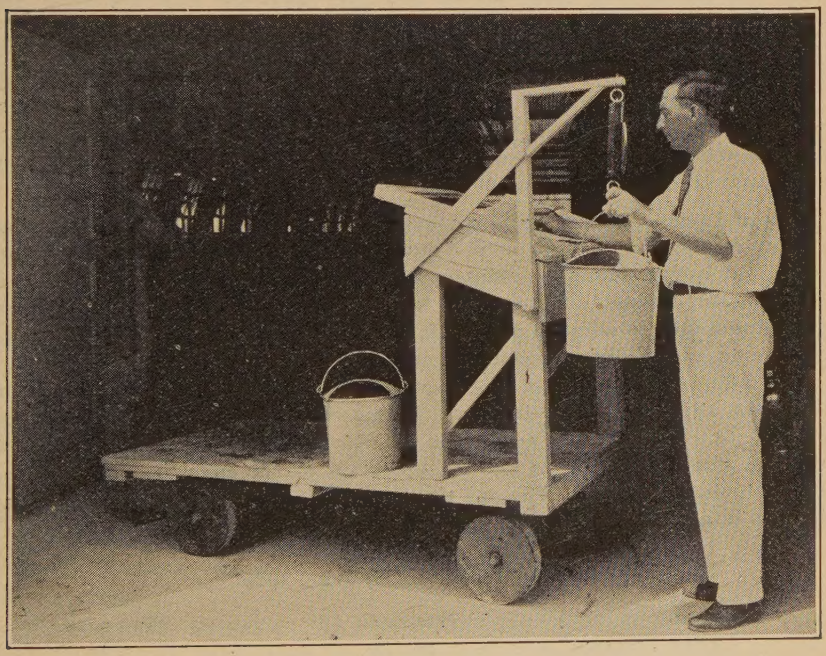
Because of the moderate elevation and rolling surface with good drainage, the Piedmont has a remarkably healthful climate. The average annual temperature is 60 degrees F. The range in temperature in both summer and winter is greater perhaps than in any other sections of the State, yet it is not great enough to cause discomfort. The annual rainfall is around 48 inches and is well distributed throughout the year. The growing season extends from April 10 to October 20, and is sufficient for all staple crops of the region.

The climate of the Coastal Plain is mild, with a long growing season and ample rainfall. The long summers with relatively high uniform temperatures are favorable to the production of cotton and tobacco. The temperature in summer averages around 80 degrees F., while that of winter is 42 degrees F. The frost-free season ranges from 200 to 210 days. Slight freezes occur in winter, but these are usually of short duration. The average annual rainfall for the region is 52 inches. With the mild winters, cover crops and vegetables can be grown the year round.

Because of the favorable situation, the climate of the Tidewater region is mild and equable throughout the year. The presence of large bodies of

water temper the air in winter and early spring, and lessen the danger from late and early frosts. The growing season is longer than for other portions of the State. The records of the weather bureau show that there is an average of seven months of the year free from frost. The average rainfall is around 50 to 56 inches for the region and is fairly uniform throughout the year.

Transportation. The last few years have been remarkable for the success which has attended the road building program in the mountains of North Carolina. Paved highways now connect all the counties of the region and furnish outlets to markets in other sections. One railroad line passes entirely through this section from east to west and another line crosses it from north to south. However, there are several counties lacking in direct rail outlets; to these highway transportation is now the most feasible method.



Accurate records are an important part of a successful farm enterprise

One main line railroad traverses the center of the Piedmont region. Branch lines extend out on both sides. Five railroads cross part of the section and furnishes outlets to other parts of the State and country. A network of hard surface highways radiates from all the principal towns and furnish connections with all counties of the region. Over these roads ply fast express trucks and passenger coaches.

Two great main line railroads cross Coastal Plain North Carolina. Branch lines serve nearly all parts of the region and provide outlets to the main-line roads and to the seaports. Fruits and vegetables are handled on fast

schedules to Northern markets. Throughout the region there extends a unified system of paved state and county highways. The railroad service is supplemented by fast express truck lines. Passenger bus connection has been established between the chief towns.

Transportation facilities are inadequate in many areas of the Tidewater region. Swamps, sounds, and broad rivers serve to separate the region into groups of counties and often isolate outlying towns and villages. Branch railroad lines connect the principal towns with the trunk lines north and south. Within the past few years state highways and bridges have been built which link up this section with other parts of the State as never before. In addition to the railroads and highways regular boat lines furnish coastwise transportation.

Land Area in Farms. The land area of North Carolina is 31,193,600 acres, of which 18,593,670 acres are in farms. Farm lands comprise approximately 60 per centum of the total acreage. Of the farm land 7,738,826 acres are improved. This amounts to 41.6 per centum. The improved land consists of 6,856,933 acres of crop land and 881,893 acres of plowable pasture land. In addition there is a considerable amount of land which is partly improved. Woodland pasture makes up 1,386,759 acres and other pasture 548,394 acres. The balance of the land in farms is classified as woodland not in pasture, and constitutes 7,069,724 acres. All other land, such as roads, farmsteads, and waste land comprise 1,849,967 acres.

Size of Farms. According to the Agricultural Census of 1925, the average size of farms in the State is 65.6 acres. However, it is well to bear in mind that in the census classification every separate unit, whether operated by an owner, a tenant, or a cropper was counted as a farm. If the croppers are eliminated the average size of farm is 80.4 acres. Perhaps this figure represents nearer the true average farm.

The following table gives the number of farms by size. According to this table there are 21,715 farms or 7.7 per cent less than 10 acres, 159,864 or 56.4 per cent under 50 acres, and 227,993 or 80.4 per cent less than 100 acres in size. Large farms are the exception rather than the rule. There are 1,720 farms, or less than one per cent, over 500 acres in size, of these 373 are over 1,000 and 15 over 5,000 acres.

Number of Farms by Size, 1925*

Group	Number	Percentage
Under 10 acres	21,715	7.66
10 to 19 acres	44,332	15.64
20 to 49 acres	93,817	33.09
50 to 99 acres	68,129	24.03
100 to 174 acres	37,611	13.27
175 to 499 acres	16,168	5.70
500 to 999 acres	1,347	.48
1,000 and over	373	.13
Total	283,482	100.00

*Agricultural Census, 1925.

Tenancy. When the farms of the State are classified by tenure it is found that 132,610 are operated by full owners, 22,195 by part owners, 423 by managers, 7,520 by cash tenants, 68,315 by share tenants, and 52,419 by croppers. The percentage of farms operated by tenants is 26.7, while the percentage operated by croppers is 18.5 per cent, or a total percentage tenancy of 45.2 for the State.

In 1924 there were 5,574,921 acres of crop land harvested in the State. Of this amount, 1,608,671 acres were harvested by tenants and 970,508 by croppers, or approximately 46 per centum of the crop land was operated by tenants and croppers.

Farm Income. The total value of the 1928 farm production in North Carolina was estimated at $383,101,000 or $1,351 per farm. Of this amount $304,101,000 or 79 per cent represents crop production and $79,000,000, or 21 per cent livestock and livestock products. Approximately two-thirds of the crop production—to the value of $202,734,000—was sold, and one-third was used for feed for farm livestock or set aside as food for the farm families. One-half of the total livestock production was sold and the other half was used for food on the farm. The total farm sales for both crops and livestock were $242,234,000 or $854 per farm. Available information indicates that about five-eighths of the total farm production was sold, two-eights used on the farm for feed and for seed, and one-eighth was kept on the farm as food for the farm family.

In 1927 from a survey of 1,200 farms* typical of all sections of the State, it was found that 68.3 per cent of the farm receipts were taken to pay the cash expenses for operating the farm, and 31.7 per cent was left as the cash farm income. If the same ratio holds true for the 283,482 farms in the State, then the cash farm income for 1928 was $76,678,817. If the cash farm income were equally divided among the 283,482 farmers it would give them $270 apiece. This figure represents the amount each farmer would have for living expenses for the year after paying for fertilizer, feed, seed, hired labor, repairs, tools, taxes and other cash farm expenses.**

In 1928 North Carolina ranked sixteenth among the states of the Union in the value of her agricultural production. The production in 1928 represents about 2.5 per cent of the production in the United States, and almost 3.5 per cent of the crop production, but less than 1.5 per cent of the livestock production. In short, North Carolina is predominantly a crop producing area.

The preceding discussion has presented a description of the natural and economic factors influencing the agriculture of the State. In the sections that follow, an attempt has been made to outline plans whereby farming as a business may be made more profitable. For the sake of clarity the discussion has been divided into sections corresponding to the natural divisions of the farmer's problems. Crops and soils, livestock and the various combinations of enterprises that make up the farm as a whole are considered with the state-wide program in mind throughout.

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*Bulletin No. 267, North Carolina Agricultural Experiment Station, "Farm Income and Taxation in North Carolina."

**Compare pp. 11-15 University of North Carolina Extension Bulletin, Volume II, No. 6, "How Farm Tenants Live."

FIELD CROPS

Any successful agricultural program must conform rather closely to the type of agriculture already being practiced. Radical changes in present farming systems are not usually advisable and are not advocated. However, in many instances, certain changes would result in decided advantages. North Carolina soils and crops show as great a variety as those of any state; nevertheless, many individual farmers do not take advantage of their possibilities for diversification, but rely too generally on a "one-crop" system. In different parts of the State, cotton, tobacco, peanuts, truck crops, grains and livestock are each dominant farm enterprises. Often the dominant enterprise is developed to the exclusion of others. It would be impossible to lay down a single program to fit all these sections. For this reason, the state has been divided into eight agricultural areas, based on the type of farming being generally practiced. The boundaries of these areas are approximate, and the recommendations made are for the general run of farms in each area. There will be some farms in each area on which the type of agriculture is more like that of another section, and such farms should follow recommendations for that area. In each of the areas attempt has been made to provide for farms that are run:

(1) Mainly for the production of money crops.

(2) Partly for money crops and partly for livestock products.

(3) Mainly for livestock products.

However, there are certain needs that apply to the agriculture of the whole state.

(1) **Food and Feed.** Many thousands of farms make no attempt to provide food and feed for the family and animals kept on the farm. It is recommended that each farm grow such food crops as are suitable to the soil and climatic conditions, and enough feed and pasture for the work stock, and in addition for at least one dairy cow per farm family.

(2) **Soil Fertility.** Most North Carolina soils are too low in fertility. North Carolina farmers use more commercial fertilizers than do those of any other state, but they neglect, in too many cases, to grow legumes for soil improvement, to lime properly, to provide good drainage, to control erosion, and to cultivate well, hence much of the money spent for fertilizer fails to give best returns.

(3) **Higher Yields of Crops.** The average acre-yields of corn, cotton, tobacco, wheat, peanuts, and other crops are low as compared to possibilities. A great many farmers are content to cultivate, year after year, large areas of these crops on poor soils, and to secure distressingly low yields, when they could and should double or treble these yields by the adoption of better systems of farm management.

The acreage of legumes for soil-improvement, and the acreage to food and feed crops could be increased to advantage, without interfering with present crop acreages, by the adoption of suitable crop rotations. Yields may be further increased by the correct use of fertilizers and lime, by better methods of cultivation, terracing and drainage, and by the use of improved seed of adapted varieties of different crops. Crops are planted on many soils on which profitable yields are not possible on account of fundamental limitations of the soil or climate. In such cases, there should be a radical change in the cropping systems.

(4) **Pastures.** There is need for more pastures of good quality. This need may be satisfied by the improvement of existing pastures, and by the proper development of lands now idle.

(5) **Quality of Farm Products.** The profit from growing crops may be greatly increased by improving their quality. The use of improved seed, proper fertilization, better methods of harvesting, strict grading, and better preparation for market would go far to bring this condition to pass.

(6) **Farm Machinery.** As a means of reducing the cost of production of practically all crops grown, larger units of farm power and more farm machinery per farm worker should be used. In some instances, changing the shape and size of fields and removal of stumps must precede this extended use of machinery.

PERCENTAGE OF CULTIVATED LAND IN DIFFERENT CROPS, BY AREAS

1928 STATE CROP CENSUS

Crop	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7	Area 8
Corn	46.4	43.7	28.4	29.3	30.9	38.5	35.0	50.0
Cotton	11.2	7.8	28.0	30.3	48.9	-------	19.4	-------
Tobacco	-------	14.9	7.4	24.1	6.8	32.0	-------	-------
Peanuts	-------	10.2	33.0	2.8	-------	-------	-------	-------
Potatoes	12.2	2.1	-------	-------	-------	-------	-------	3.6
Sweet Potatoes	2.6	4.5	-------	-------	-------	-------	-------	-------
Grains	-------	-------	-------	-------	6.7	13.8	28.6	16.3
Soybeans	25.9	5.5	-------	2.1	3.8*	3.9*	6.4*	3.9*
Cowpeas	-------	3.1	-------	3.5	-------	-------	-------	-------
Hay	-------	-------	-------	-------	-------	-------	6.0	22.3
Truck	3.2	6.8	-------	-------	-------	-------	-------	3.0
Others	-------	1.4	3.2	7.9	2.9	11.8	4.6	.09

*Soybean and cowpeas percentages combined.

AGRICULTURAL AREAS OF NORTH CAROLINA

Area 1 includes Currituck, Camden, Pasquotank, Tyrrell, Dare, Hyde, Pamlico, and parts of Perquimans, Washington, and Beaufort counties.

The topography of this area, which lies in the flatwoods of the Coastal Plain, is level, with very low elevation above sea-level and poor natural

Type of Farming Areas in North Carolina

drainage. There are a great many extensive swamp lands, and it is necessary to provide artificial drainage for practically every field. Many of the soils are dark in color. They vary in texture from peats to sandy loams, with silt loams and fine sandy loams predominating. As a rule they are productive when properly drained and well-managed. Soils that cannot economically be made productive, and cut-over lands not needed for field crops should be developed as pastures, or else reforested.

In Northeastern Carolina, the peanut is an important cash crop

The principal classes of livestock kept in this area are work animals and hogs. The great production of corn is favorable to the production of the latter. There are not enough dairy cows in the area to supply milk to the farm population. Large herds of so-called beef cattle were formerly pastured in the swamps in summer and the cornfields in winter, but with the advent of the stock law this industry has about disappeared.

Corn occupies nearly half the cultivated land, while soybeans are planted on about one-fourth of it. The remainder of the cultivated land is given over mainly to cotton (on the better drained soils), Irish potatoes, sweet potatoes, and various truck crops. The sale of soybean seed provides a fairly reliable source of income. The waste beans are eaten by hogs, while the practice of turning under the soybean vines is beneficial to the soil. Although soybean hay is second only to alfalfa as a feed, relatively very little of the crop is used in that way. It appears there should be a considerable increase in the acreage of soybean and oat hays, at the expense

of the present corn acreage. This would permit of the introduction of more livestock, which would fit in well with soybean farming, and give insurance against disaster when the prices of money crops fall too low.

Most of the farms of this area could be made to produce higher yields per acre, and also a greater diversity of crops, if they were equipped with more modern farm machinery and so organized as to use one of the following crop rotations:

CROP ROTATIONS FOR AREA 1

1. **For black soils, especially where drainage is poor:**

First year.	Corn (for grain).
Second year.	Soybeans mainly for seed, with vines turned under, part being cut for hay.

Note:—Liming will be necessary on most soils of this character for best results.

2. **For livestock farms:**

First year.	Corn (for grain) and velvet beans (for grazing and turning under).
Second year.	Corn (for grain) and soybeans (for seed, grazing, and turning under).
Third year.	Spring oats (for hay), followed by soybeans for hay); or lespedeza (for grazing); or cotton.

3. **For truck farming:**

First year.	Corn (for grain).
Second year.	Irish potatoes or early truck crops, followed by corn, cotton, soybeans, or sweet potatoes. Abruzzi rye in fall (for grazing and turning under).
Third year.	Soybeans, for seed (with vines turned under).

Fertilizers Recommended per Acre

Corn	400-600 lbs.	8-6-4	(on soils low in organic matter)
		8-4-4	(on soils high in organic matter) part of nitrogen applied as top-dresser.
Cotton	600-800 lbs.	8-6-4	(on soils low in organic matter)
		8-4-4	(on soils high in organic matter) part of nitrogen applied as top-dresser.
Potatoes and truck crops		1000-2000 lbs.	7-5-5
Soybeans, Cowpeas, Velvet beans		300- 400 lbs.	8-2-4
Sweet potatoes		1000-2000 lbs.	8-3-8 (early market)
		800 lbs.	8-3-8 (late crop)

Varieties Recommended

Corn	Latham's Double, Horse Tooth, Early Yellow Dent.
Cotton	Carolina Foster, Mexican, Cleveland.
Soybeans	For general purpose: Mammoth Yellow, Herman, Tokio, Laredo.
	For hay: Laredo, Otootan, Virginia.
Oats	Fulghum, Appler.
Barley	Tennessee No. 6.
Rye	Abruzzi.
Lespedeza	Common Kobe, Tennessee 76.

Note:—At present most of the soybeans grown are the Mammoth Yellow. It should be profitable to grow more of the other varieties, since they command a higher price per bushel when sold for seed.

Velvet Beans	Early Speckle, Osceola.
Cowpeas	Brabham, Iron, Groit, Whippoorwill, Black.

Pasture Mixtures

1. **For light silt loams and sandy loams:**

Carpet grass	8 pounds
Dallis grass	5 pounds
Kentucky blue grass	3 pounds
Redtop	3 pounds
White clover	2 pounds
Lespedeza	12 pounds
Total per acre	33 pounds

2. **For fertile black soils:**

Kentucky blue grass	8 pounds
Redtop	8 pounds
White clover	2 pounds
Lespedeza	12 pounds
Total per acre	30 pounds

Area 2 includes Carteret, Onslow, Pender, New Hanover, Brunswick, Columbus, and parts of Craven, Jones, Duplin, Sampson and Bladen counties.

This is in the flat coastal region, but without large inland bodies of water such as are found in Area 1, and therefore with fewer swamp areas. There is, however, a high percentage of silt loams and sandy loams which, owing to the level topography, or to the fact that they are underlaid with hardpan, are rather difficult to drain. Such soils when underlaid by a sandy clay subsoil without a hardpan, are very productive after proper drainage has been established. There are also sections in this area known as sandhills or pine barrens, where the soils are almost pure sand, and are of no great present agricultural value for growing crops. All lands that are unfit for cultivation as well as the cut-over lands not needed at present, should be developed as pastures or, reforested.

Work animals and hogs comprise the principal livestock, with some poultry, but few cattle. As in Area 1, the practice of pasturing cattle in woods and swamps has been largely discontinued.

Over 40 per cent of the cultivated land is planted to corn, about 15 per cent to tobacco, 10 per cent to peanuts, 7 per cent to cotton, and 13 per cent to truck crops.

This area was a part of the main cotton growing region of the State before the arrival of the boll weevil. Now, the growing of cotton has been partially abandoned, and its culture is inadvisable except on some of the better drained soils. Its place as a source of income has largely been taken by tobacco, and truck crops (mainly Irish and sweet potatoes, strawberries, beans, cucumbers, and lettuce), and hogs.

Adaptable varieties of soybeans may be determined by field demonstrations

The corn crop is the basis for the growing of hogs. It would be wise to reduce the corn acreage somewhat, and grow more legumes for soil improvement, which should result in an increased production of corn. A good way to do this would be to plant soybeans or velvet beans in every cornfield, in alternate rows with the corn. Soybeans, also, should prove more satisfactory than peanuts, as the seed would bring in a cash income, and hogs could eat the shattered beans.

Some farmers of this area get high returns from tobacco, by growing it on fertile, sandy loams. It is necessary under these conditions to change fertilizer formulas and cultural methods to fit the high degree of fertility.

Less than five per cent of the cultivated land of this area is planted to hay crops. Hay and pasturage should be made the basis of keeping at least enough cows to supply the population with milk. There is abundant land, unfit for cultivation, which would make excellent pastures.

These recommendations may best be put into effect by the adoption of one of the following crop rotations:

CROP ROTATIONS FOR AREA 2

1. **For general farming:**

   First year. Corn (for grain) with velvet beans (for grazing and turning under. Abruzzi rye in fall (for grazing and turning under).

   Second year. Corn (for grain) with soybeans (for seed, grazing, and turning under).

   Third year. Oats (for hay) followed by soybeans (for hay) Lespedeza (for grazing), Truck crops, or cotton Abruzzi rye in fall (for grazing and turning under).

2. **To be used in connection with No. 1, on the well-drained parts of the farm:**

   First year. Cotton, or truck crops. Abruzzi rye in fall (for grazing and turning under).

   Second year. Tobacco, with cowpeas sown at last cultivation (for turning under).

3. **For general farming of well-drained soils:**

   First year. Corn (for grain) with soybeans (for seed, grazing and turning under).

   Second year. Cotton or truck crops. Abruzzi rye in fall (for grazing and turning under).

   Third year. Tobacco, with cowpeas sown at last cultivation (for turning under).

4. **For blacklands:**

   First year. Corn (for grain).

   Second year. Soybeans (part for seed, with vines turned, and part for hay).

Note:—Liming is generally necessary on this type of soil for best results.

Fertilizers Recommended per Acre

Corn	400-600 lbs.	(8-6-4) part of nitrogen applied as top-dresser.
Cotton	600-800 lbs.	(8-6-4) on soils low in organic matter.
	600-800 lbs.	(8-4-4) on soils high in organic matter.
Tobacco	1000 lbs.	(8-4-6) Average soils. (See page 40).
	1000 lbs.	(8-3-5) Fertile soils. (See page 40).
Soybeans	300- 400 lbs.	(8-2-4)
Cowpeas	300- 400 lbs.	(8-2-4)
Velvet Beans	300- 400 lbs.	(8-2-4)
Irish Potatoes	1000-2000 lbs.	(7-5-5)
Sweet Potatoes	800 lbs.	(8-3-8)
Truck crops	1000-2000 lbs.	(7-5-5)

Varieties Recommended

Corn	Latham's, Horse Tooth, Biggs', Jarvis (Yellow).
Cotton	Carolina Foster, Mexican, Cleveland.
Tobacco	Cash, White Stem Orinoco, Jamaica Wrapper, Bonanza.
Velvet beans	Early Speckle, Osceola.
Cowpeas	Brabham, Iron, Groit, Whippoorwill, Black.
Soybeans	For seed and pasture: Mammoth yellow, Biloxi, Tokio, Herman, Laredo. For hay: Otootan, Laredo.
Oats	Fulghum, Appler.
Barley	Tennessee No. 6.
Rye	Abruzzi
Lespedeza	Common, Kobe, Tennessee 76.

Pasture Mixtures Recommended

1. **For moist sandy soils:**

Carpet grass	10 pounds
Dallis grass	5 pounds
Lespedeza	15 pounds
Total per acre	30 pounds

2. **For fertile, fairly well-drained loamy soils:**

Carpet grass	8 pounds
Dallis grass	4 pounds
Kentucky blue grass	3 pounds
Redtop	3 pounds
White clover	2 pounds
Lespedeza	10 pounds
Total per acre	30 pounds

Area 3 includes Gates, Chowan, Hertford, Bertie, Martin, and parts of Perquimans, Washington, Edgecombe, Halifax, and most of Northampton counties.

This area lies in the middle Coastal Plain region, the topography of which ranges from level to very gently rolling, with a somewhat higher elevation than the Tidewater or Flatwoods region, and generally with much better drainage. The soils are of three general classes: well-drained sandy and fine sandy loams, which include the Norfolk, Ruston, Orangeburg and other related series; poorly drained sandy loams, fine sandy loams and silt loams to which belong the Dunbar, Portsmouth, Coxville, Bladen, and other series; and lastly, some excellent first and second bottoms along the Roanoke River. There is less swamp land than in Areas 1 and 3. As a rule, the cultivated soils if properly drained, fertilized and cultivated, and well supplied with organic matter, are very productive.

As in Areas 1 and 2, there is a shortage of cattle; a large number of hogs, which are fattened mainly on waste peanuts; a considerable amount of poultry; and enough work animals to cultivate the land.

Corn, cotton and peanuts are of about equal importance from the standpoint of acreage, and together occupy about 90 per cent of the cultivated area, with tobacco fourth in importance.

The corn yields are too low, and could be doubled by the growth and turning under of crops of vetch, crimson clover, soybeans, or other legumes with present methods of fertilization and cultivation.

While cotton is often damaged by the boll weevil, in this area, weather conditions as a rule are such that it pays to grow this crop, if proper attention is given to selection of soil type and to soil building, fertilization, choice of varieties and cultivation. It is not advisable to attempt to grow cotton on poorly drained soils that are slow to "warm up" in the spring, and on which the crop naturally matures late.

The peanut crop is of first importance in the mind of the average farmer of this area. Although a legume, this crop has done more to deplete the soils of this section than all other crops combined. This is because after having been growing in most cases, without fertilizer, the entire crop is taken from the land, and no provision is made for replacing the plant food constituents thus removed nor of replenishing the organic matter in the soils. The result is a yield of less than 50 bushels per acre on lands that formerly made about double this yield.

The peanut crop supplies a fair quality of hay, however, and though the yield per acre is small, the total amount is almost enough for present farm needs. Little hay is bought here, in comparison with some other parts of North Carolina, but with any increase in the number of livestock it will be advisable to grow more hay.

The peanut is important as a hog feed, nuts left in the field after digging being used in this way.

The greatest need in this area is for soil improvement. The three most important crops,—corn, peanuts, and cotton,—are now grown in such a way as to steadily deplete the soil. They could easily be combined in rotations with soil-building crops, so as to increase the yields from year to year.

CROP ROTATIONS FOR AREA 3

(1) For General Farming

1.	First year.	Corn (for grain) with soybeans (for seed, grazing and turning under).
	Second year.	Peanuts, Abruzzi rye in fall (for grazing and turning under).
	Third year.	Cotton or tobacco. Vetch or crimson clover in fall for turning under.
2.	First year.	Corn (for grain) with soybeans (for seed, grazing and turning under.
	Second year.	Cotton, crimson clover, vetch or Abruzzi rye in fall (for grazing and turning under).
	Third year.	Peanuts, crimson clover, or vetch in fall (for turning under).

(2) **For General and Livestock Farming**

3. First year. Corn (for grain) with soybeans (for seed, grazing, and turning under).
   Second year. Peanuts, Abruzzi rye in fall (for grazing and turning under).
   Third year. Cotton or Tobacco.
   Fourth year. Oats or barley (for hay) followed by soybeans (for hay) Crimson clover or vetch in fall (for turning under).

On black poorly drained soils, the rotations given for regions 1 and 2 might be used to good advantage by most farmers.

Fertilizers Recommended per Acre

Corn	400-600 lbs.	8-6-4 part of nitrogen applied as side application.
Cotton	600-900 lbs.	8-6-4 part of nitrogen applied as side application.
Peanuts	400 lbs.	8-2-4 and 500 lbs. of land plaster.
Tobacco	1000 lbs.	8-4-6 for average soils (See page 40).
	1000 lbs.	8-3-5 for fertile soils (See page 40).
Soybeans	300-400 lbs.	8-2-4
Cowpeas	300-400 lbs.	8-2-4
Velvet Beans	300-400 lbs.	8-2-4

Varieties Recommended

Corn	Biggs', Latham's, Jarvis (Yellow)
Cotton	Cleveland, Mexican
Peanuts	Virginia Bunch, Jumbo, Virginia Runner.
Tobacco	Cash, White Stem Orinoco, Jamaica Wrapper, Bonanza.
Velvet Beans	Early Speckle, Osceola.
Cowpeas	Brabham, Iron, Groit, Whippoorwill, Black.
Soybeans	For seed and pasture: Mammoth yellow, Biloxi, Tokio, Herman, Laredo.
	For hay: Otootan, Laredo.
Oats	Fulghum, Appler.
Barley	Tennessee No. 6.
Rye	Abruzzi.
Lespedeza	Common, Korean, Tennessee No. 76.

Pasture Mixtures

For moist sandy and loam soils:

Carpet grass	10 pounds
Dallis grass	5 pounds
Lespedeza	15 pounds
Total per acre	30 pounds

On fertile soils the above mixture may be slightly reduced and supplemented with three to five pounds each of Kentucky blue grass, red top, and white clover.

Area 4 includes Pitt, Nash, Wilson, Lenoir and parts of Edgecombe, Beaufort, Craven, Jones, Duplin, Wayne, and Johnston counties.

This area is a part of the middle Coastal Plain. The topography is gently rolling. The soils are similar to those of Area 3, but with a higher percentage of well-drained sandy loams. The low-lying soils are well distributed but are relatively unimportant.

This area is given over mainly to the culture of cotton and tobacco. There are not enough hogs, cattle or poultry to supply the needs of the farms. Hay is bought in great quantities and at high prices for work animals and for the few cattle kept, little attempt being made to produce any at home. Too little attention is paid to maintaining or improving the natural fertility of the soils.

Farm lands in the middle Coastal Plain are gently rolling. The soil is easily cultivated

Most farmers depend entirely upon commercial fertilizers in the production of major crops. The average application per acre is gradually increasing. The high returns secured from a good crop of cotton or tobacco, together with the prevalence of tenantry and the credit system, leads landowners in far too many cases to neglect the fundamental needs of their soils. Much higher quality tobacco and cotton could be raised than at present, and more livestock could be supported, if the soils of this area were built up to produce as they might be made to do.

It would not be too difficult to do this. There are several leguminous crops, such as soybeans, velvet beans, vetch and crimson clover which thrive here and could be grown without interfering with the production of either corn, cotton or tobacco. The turning under of these legumes would add to the organic matter and nitrogen supply of the soils and would improve their tillage, water-holding capacity and drainage. The adoption of such a system would result in higher average crop yields.

Since the acreages of corn, cotton and tobacco are nearly equal, it would be easy to plan rotations with these and the necessary soil-improving crops

without upsetting the general scheme of farming now being generally practiced. Such rotations are as follows:

CROP ROTATIONS FOR AREA 4

1. For General Farming:

First year. Corn (for grain) with soybeans or velvet beans (for seed, grazing, and turning under).

Second year. Cotton, Abruzzi rye in fall (for grazing and turning under).

Third year. Tobacco, hairy vetch or crimson clover in fall (for turning under).

On farms partly devoted to livestock, oats or barley and vetch may follow the tobacco, and another year be added to the rotation, as follows:

Fourth year. Oats and vetch (for hay), followed by soybeans (for hay). Vetch or crimson clover in fall (for turning under).

2. For Dairy or other Livestock Farms:

First year. Corn (for grain) with velvet beans (for grazing and turning under). Abruzzi rye in fall (for grazing).

Second year. Corn (for silage or grain) with soybeans (for grazing and turning under).

Third year. Oats and vetch or spring oats (for hay) followed by soybeans for hay. Crimson clover or vetch in fall (for grazing and turning under).

Fertilizers Recommended per Acre

Corn. 400 to 600 pounds. 8-6-4 (part of nitrogen as side application).
Cotton. 600-900 pounds. 8-6-4 (part of nitrogen as side application).
Tobacco. 1,000 pounds. 8-4-6 (on average soils). (See page 40).
1,000 " 8-3-5 (in rotation with legumes). (See page 40).
Oats or barley. 400 pounds. 8-6-4 (part of nitrogen as top dresser in spring).
Soybeans, Cowpeas and Velvet Beans. 400 pounds 8-2-4.

Varieties Recommended

Corn.	Biggs', Latham's, Cocke's, Jarvis (yellow).
Cotton.	Cleveland, Mexican, Dixie-Triumph (wilt resistant).
Tobacco	Cash, White Stem Orinoco, Jamaica Wrapper, Bonanza.
Oats.	Fulghum, Appler.
Barley.	Tennessee No. 6.
Rye.	Abruzzi.
Soybeans.	For seed and pasture—Mammoth yellow, Biloxi, Tokio, Herman, Laredo. For hay: Otootan, Laredo.
Cowpeas.	Brabham, Iron, Groit, Whipporwill, Black.
Velvet beans.	Early Speckle, Osceola.
Lespedeza.	Common, Kobe, Tennessee No. 76.

Pasture Mixtures

For moist and sand loam soils:

Carpet grass	10 lbs.
Dallis grass	5 lbs.
Lespedeza	15 lbs.
Total per acre	30 lbs.

On fertile soils, the above mixture may be slightly reduced and supplemented with from three to five pounds each of Kentucky blue grass, redtop and white clover.

Area 5 includes Warren, Franklin, Wake, Lee, Harnett, Cumberland, Hoke, Robeson, Scotland, Richmond, Anson, Union, Mecklenburg, Gaston, Lincoln, Cleveland, Rutherford, Polk, and parts of Northampton, Halifax, Durham, Chatham, Bladen, and most of Johnston and Sampson, and a small part of Wayne counties.

This area includes all the Coastal Plain, outside of Areas 1, 2, 3, and 4, several Piedmont counties adjoining the Coastal Plain, and the Piedmont counties along the southern border of the State as far west as the Blue Ridge mountains. The topography of the area varies from the level lands of the Coastal Plain, through the rolling Sandhills and lower Piedmont to the hilly and rocky lands of the upper Piedmont. Drainage conditions in this area are as varied as is the topography.

The soils range from coarse sands to silt loams in the Coastal Plain, and from sandy loams to heavy clays in the Piedmont plateau.

All this area has one thing in common—cotton is the principal crop, occupying nearly half of the cultivated acreage. The boll weevil often does severe damage in Robeson, Scotland, Hoke, Cumberland, and other Coastal Plain counties, while in the Piedmont, it is usually held in check by the dry summers and cold winters. Counties where weevil damage is most severe may be expected to turn to tobacco, truck crops and livestock, with a corresponding decrease in the cotton acreage. However, it will always be profitable to grow cotton, if care be taken to obtain high yields of good grade and staple.

Corn, grown on 30 per cent of the cultivated land, ranks second in importance. The yields are too low at present, but they might be economically, increased to the point where the present acreage will produce a surplus and so pave the way for maintaining the livestock now kept here.

From an acreage standpoint, tobacco and small grains are of about equal importance, the tobacco being grown entirely in the eastern part of the region and small grains mainly in the western part.

In Mecklenburg, Gaston, Union, Wake, and possibly one or two other counties in which large towns are located commercial dairying is fairly well developed. However, there is a shortage of dairy cows throughout most of the area, while there are not enough poultry and hogs kept to adequately supply local needs.

As in Area 4, at least half of the land is worked by tenants, and the credit system is quite common. This system is conducive to the buying of hay and other feedstuffs that might be grown on the farms. Other disadvantages

of tenant farming are the use of poor seed and poor implements, inefficient methods of cultivation, soil erosion in some counties, and the depletion of the organic matter of the soils. More serious still, the planting of such a high percentage of clean cultivated crops is causing the soil of some of the Piedmont counties to wash badly.

At the same time, there are outstanding farms all over this area which are not only self-supporting from a feed standpoint, but which are producing high yields of crops, have other important sources of income besides cotton, and on which the soil is steadily growing better in physical condition and productiveness. On these farms, surface water is probably taken care of by terraces or ditches, legume crops are grown regularly for soil improvement, and sufficient farm power and field machinery are kept to work the crop at the proper time. One of the secrets of success on these farms is that usually well planned rotations of crops are being followed. Such rotations are an advantage on farms where cotton is almost the only source of income, as well as on those that have two or three major projects, and should be practiced on all farms.

The following are suitable for this region:

CROP ROTATIONS FOR AREA 5

1. For Cotton Farms:

First year. Corn (for grain) with soybeans (for seed, grazing and turning under).
Second year. Cotton.
Third year. Cotton (or tobacco on part of land).

In connection with this rotation, corn, oats, and soybeans may be grown on lands unsuitable for cotton.

2. For Cotton and General Farming:

First year. Corn (for grain) and soybeans (for seed, grazing and turning under).
Second year. Oats or barley and vetch (for hay), followed by soybeans (for hay) (or lespedeza) (for grazing and turning under).
Third year. Cotton.
Fourth year. Cotton, vetch or crimson clover in fall (for turning under).

If desired, one year of cotton may be omitted, leaving a three-year rotation.

Fertilizers Recommended per Acre

Corn—Coastal Plain. 400-600 lbs. 8-6-4 (part of nitrogen as a side application).
Piedmont. 300-400 lbs. 10-4-4.
Cotton—Coastal Plain. 600-900 lbs. 8-6-4 (part of nitrogen as a side application).
Piedmont. 600-800 lbs. 10-4-4.
Tobacco—Coastal Plain. 1,000 lbs. 8-4-6 (see page 40).

Small Grains—Costal Plain. 400 lbs. 8-6-4 (part of nitrogen as top dresser).
Piedmont. 400 lbs. 10-4-4 (part of nitrogen as top dresser).
Soybeans, Cowpeas, Velvet beans—Costal Plain. 300-400 lbs. 8-2-4.
Piedmont. 300-400 lbs. 10-2-4.

Varieties Recommended

Corn.	Latham's, Biggs', Cocke's, Jarvis (Yellow), Indian Chief (Yellow).
Cotton.	Cleveland, Mexican, Dixie Triumph (wilt resistant).
Tobacco.	Cash, White Stem Orinoco, Jamaica Wrapper, Bonanza.
Oats.	Fulghum, Appler, Lee.
Wheat.	Red Hart, Purple Straw, Leap's, Fulcaster, Gleason.
Barley.	Tennessee No. 6.
Rye.	Abruzzi.
Soybeans.	For seed and pasture—Mammoth Yellow, Biloxi, Tokio, Laredo (wilt resistant). For hay—Laredo (wilt resistant), Otootan.
Cowpeas.	Brabham, Iron, Groit, Whipporwill, Black.
Velvet Beans.	Early Speckle, Osceola.
Lespedeza.	Common, Kobe, Tennessee No. 76.

Pasture Mixtures Recommended

(1) For moist sandy soils in the Coastal Plain:

Carpet grass	10 lbs.
Dallis grass	5 lbs.
Lespedeza	15 lbs.
Total per acre	30 lbs.

On fertile fine sandy and loamy soils the above mixture may be slightly reduced, being supplemented with from 3 to 5 pounds each of Kentucky Blue grass, redtop and white clover.

(2) For well-drained soils of fine texture and of medium to strong fertility in the Piedmont section:

Kentucky blue grass	3 lbs.
Redtop	3 lbs.
White clover	2 lbs.
Orchard grass	8 lbs.
Oat grass	4 lbs.
Alsike clover	2 lbs.
Lespedeza	8 lbs.
Total per acre	30 lbs.

(3) For soils of the same type without good drainage:

Kentucky blue grass	3 lbs.
Redtop	3 lbs.

White clover	2 lbs.
Orchard grass	8 lbs.
Dallis grass	4 lbs.
Lespedeza	10 lbs.
Total per acre	30 lbs.

Area 6 includes Vance, Granville, Person, Caswell, Rockingham, Stokes, Surry, and parts of Durham, Orange, Alamance, Guilford, Forsyth, and Yadkin counties.

This is a typical Piedmont section, consisting of a gently rolling plateau, which becomes steeper near the mountains, and is considerably cut up by streams. The soils are mainly sandy loams with friable, sandy clay subsoils, derived from sandstone and coarse granite. There are also small scattered areas of clay loam and clay. Erosion is a serious problem with the farmers.

This area, known as the Old Tobacco Belt, is not a livestock section. It is not as well stocked with hogs as is most of the Coastal Plain, but on the other hand it is better supplied with cattle. Work animals are the principal kind of livestock kept on the farms.

The corn crop leads in acreage, covering about 38 per cent of the cultivated land. A large part of the crop, grown on lands intentionally kept poor so as to produce bright tobacco, makes low yields. A change in the farming system, reducing the corn acreage, and increasing that of clovers and other legumes, would double the corn yields.

The chief interest has always been centered in the production of tobacco, about one-third of the cultivated land being planted annually to this crop. In order to obtain the desired quality of leaf, it is considered necessary to keep the soil fertility at a low level, and to depend entirely on commercial fertilizers to grow the crop. The average farmer also prefers to plant his tobacco on lands which have been lying out for a year or two, rather than after some other crop. For this reason, there is about half as much cleared land lying out as there is in cultivation. Erosion tends to deplete soil fertility, and on many fields has progressed so far that much of the land is now useless for growing tobacco or any other crop. Instead of these conditions, more tobacco could be produced per acre, and of as high a quality as at present, and the land could all be kept in profitable use, by the introduction of good terraces to control soil washing, the incorporation of some organic matter into the soil, and by making a change in fertilizer formulas to fit the resultant increase in soil fertility.

Small grains, mainly wheat, are planted on about 13 per cent of the cultivated lands. As grown at present, small grains are hardly a profitable crop, but they could be made so by better soil preparation and seeding, by building up the soil's natural fertility, and better fertilization, especially by the use of top-dressing with quickly acting sources of nitrogen in the spring to supplement the fertilizer applications made at planting time in the fall.

There is a great deficiency of hay in this section, though several of the best hay crops grow well. An abundance of hay could be provided along with a system for improving the soils.

In planning such a system, a difference must be made between those soils which are suited for producing the best quality of tobacco, and other soils. The former should be set aside for growing tobacco, in a rotation which will help to hold diseases in check, and which will not allow the soil to become depleted in organic matter although a legume crop should never immediately precede the tobacco. Other soils should have a rotation of grain, hay and soil-improving crops, similar to those used in the main grain-growing part of the State.

CROP ROTATIONS FOR AREA 6

1. **Tobacco Rotations:**

First year.	Tobacco, abruzzi rye in fall.
Second year.	Abruzzi rye (for grain).

2.

First year.	Tobacco, crimson clover or vetch in fall (for turning under).
Second year.	Corn (for grain). Wheat, oats or abruzzi rye in fall.
Third year.	Wheat, oats, or abruzzi rye (for grain). Abruzzi rye in fall (for turning under).

3.

First year.	Tobacco, abruzzi rye in fall (for turning under).
Second year.	Tobacco, redtop and other grasses in fall.
Third year.	Redtop, etc. (for pasture).
Fourth year.	Redtop, etc. (for pasture).

4. **Grain and Hay Rotations:**

First year.	Corn (for grain) and soybeans (for seed and turning under).
Second year.	Soybeans (for hay), wheat, or other small grain in the fall.
Third year.	Wheat or other small grain (for grain), lespedeza or red clover drilled on grain in March.
Fourth year.	Lespedeza or red clover (for hay and turning under).

5.

First year.	Corn (for grain) and soybeans (for seed and turning under) or soybeans for hay. Wheat or other small grain in fall.
Second year.	Wheat or other small grain (for grain). Lespedeza or red clover drilled on grain in March.
Third year	Lespedeza or red clover (for hay and turning under).

One ton of ground limestone per acre should be applied before sowing small grain in both the above rotations.

Fertilizers Recommended per Acre

Corn. 300 to 500 lbs. 10-4-4.

Tobacco. 1,000 lbs. 8-4-6 (on light soils—see page 40).
1,000 lbs. 10-4-6 (see page 40).

Wheat, Oats, Rye, Barley. 400 lbs. 10-4-4 in fall, 100 lbs. of nitrate of soda or its equivalent in spring.

Soybeans, Cowpeas, Velvet Beans. 300 lbs. 10-2-4; 300 lbs. 10-4-4 on poor soils.

Varieties Recommended

Corn.	Biggs', Southern Beauty, Weekley's, Cocke's, Jarvis (yellow). Indian Chief (yellow).
Tobacco.	Cash, White Stem Orinoco, Jamaica Wrapper, Bonanza.
Wheat.	Gleason, Purple Straw, Leap's.
Oats.	Fulghum, Appler, Virginia Turf.
Rye.	Abruzzi.
Barley.	Tennessee No. 6.
Soybeans.	For seed and pasture—Herman, Virginia, Laredo. For hay—Laredo, Virginia Otootan.
Cowpeas.	Brabham, Iron, Groit, Whipporwill, Black.
Velvet Beans.	Early Speckle.
Red Clover.	Medium (middle western grown), Sapling.
Lespedeza.	Common, Tennessee No. 76, Kobe, Korean.

Pasture Mixtures Recommended

(1) For fertile sandy and clay loam soils with good drainage:

Kentucky blue grass	3 lbs.
Redtop	3 lbs.
White clover	2 lbs.
Orchard grass	8 lbs.
Tall oat grass	4 lbs.
Alsike clover	2 lbs.
Lespedeza	8 lbs.
Total per acre	30 lbs.

(2) For fertile sandy and clay loam soils which have only fair drainage:

Kentucky blue grass	3 lbs.
Redtop	3 lbs.
White clover	2 lbs.
Orchard grass	8 lbs.
Dallis grass	4 lbs.
Lespedeza	10 lbs.
Total per acre	30 lbs.

Meadow fescue or timothy may be substituted for Dallis grass at high elevations.

Area 7 includes Randolph, Montgomery, Stanly, Davidson, Davie, Rowan, Cabarrus, Iredell, Wilkes, Alexander, Catawba, Caldwell, Burk, McDowell, and parts of Durham, Orange, Alamance, Guilford, Forsyth, Yadkin, Moore and nearly all of Chatham counties.

This area includes all the Piedmont region from the main cotton-growing counties to the northern limit of the Cotton Belt and westward to the Blue Ridge. The topography of the area is gently rolling, becoming gradually steeper as the Blue Ridge mountains are approached, with many large level

fields interspersed with stream bottoms. The drainage of the area is good with the exception of some of the bottoms.

The soils are clays, clay loams, silt loams, and sandy loams, derived from granite, slate and diorite ("nigger-head" rock). Many of the latter soils are especially adapted to the growing of clover and alfalfa when proper precautions are taken in their growth.

This area is the best diversified one in North Carolina, having a good balance between cotton as a money crop, and grain and hay crops for livestock. Dairying is developing rapidly, poultry brings in considerable cash income, and, as a rule, enough hogs are grown for home use. Much more improved machinery is used here than in any other part of the state. There is a smaller proportion of tenantry than in sections which depend on cotton and tobacco, and the average farm is run on a cash basis. Possibly more attention is paid by farmers of this area to soil conservation and improvement than elsewhere in North Carolina.

Corn leads in acreage with 35 per cent of all cultivated lands. It is significant that the percentage of corn is much smaller in some of the more progressive counties of this area, and that in these counties more legumes are grown. It would appear to be wise to reduce the corn acreage in favor of legumes over most of the area and thereby secure higher corn yields where the legumes are turned under.

Small grains rank next, with 28 per cent of the cultivated lands. Wheat is an important money crop in many localities. Barley is becoming an important grain feed. Barley and oats are also used for hay, but this class of hay is secondary in quality to soybeans, clover, and alfalfa hay.

Nineteen per cent of the cultivated acreage is annually planted to cotton. However, the proportion of cotton varies greatly in different counties, running from above 25 per cent along the southern border to about five per cent in other counties. In most of the area, cotton is not grown to the exclusion of feed crops.

A goodly acreage of hay is grown from soybeans, cowpeas, lespedeza, red clover and alfalfa. All these, except cowpeas and red clover, are on the increase. With red clover, the chief problem is to get the farmer to sow adapted seed and to teach him that his soils will no longer grow this crop without the proper use of lime where needed.

There is need of more legumes for soil improvement, more terraces, more pastures, and better use of idle lands, of which the proportion is all too high at present. The heavy soil types of the region, in connection with prolonged summer droughts and severe freezing in winter, make it essential to manage the soils more carefully than is done in sections where sandy soils predominate. It is impossible to plow these soils when too dry, and ruinous to do so when wet. Fall crops must be planted early enough to avoid winter-killing, and steps must be taken to insure a good seed-bed in the spring in spite of adverse conditions of rain or dought. The best way to do this is to keep the soils well supplied with humus, and to do as much fall and winter plowing as possible.

In order to facilitate proper soil management, to increase soil fertility and at the same time to provide a diversity of economic crops, every farm should be so organized as to follow one of the crop rotations given below, or a similar one.

CROP ROTATIONS FOR AREA 7

1.

First year.	Corn (for grain or silage) with soybeans (for seed and turning under).
Second year.	Soybeans (for hay), wheat or other small grain (for grain or hay).
Third year.	Wheat or other small grain (for grain or hay), red clover, sweet clover, or lespedeza drilled on grain in March.
Fourth year.	Red clover, sweet clover, lespedeza (for hay, grazing and turning under).

A part of the corn land might be planted to cotton if desired.

2.

First year.	Corn (for grain) with soybeans (for seed and turning under).
Second year.	Corn (for grain or silage), or cotton.
Third year.	Soybeans (for hay), wheat or other small grain in fall.
Fourth year.	Wheat or other small grain (for grain or hay). Red clover, sweet clover or lespedeza drilled on grain in March.
Fifth year.	Red clover, sweet clover, lespedeza (for hay, grazing and turning under).

3.

First year.	Corn (for grain or silage) with soybeans (for seed and turning under).
Second year.	Soybeans (for hay). Wheat or other small grain in fall.
Third year.	Wheat or other small grain (for grain or hay). Red clover, sweet clover, lespedeza and grasses drilled on grain in March.
Fourth year.	Clover and grass Mixture (for hay and grazing).
Fifth year.	Clover and grass mixture (for grazing and turning under).

4.

First year.	Cotton, vetch or crimson clover in fall (for turning under).
Second year.	Corn (for grain) with soybeans (for seed and turning under), or soybeans (for hay), wheat or other small grain in fall.
Third year.	Wheat or other small grain (for grain or hay) red clover, sweet clover or lespedeza drilled on grain in March.
Fourth year.	Red clover, sweet clover or lespedeza (for hay and turning under).

Note:—The cotton may be omitted, leaving a three-year rotation.

In all the above rotations, the land should be limed just before sowing small grain, to insure the success of red and sweet clover.

Fertilizers Recommended per Acre

Corn.	300 to 400 lbs. 10-4-4.
Cotton.	600 to 900 lbs. 10-4-4 or 10-5-3. 600 to 900 lbs. 10-2-4 (on fertile soils).
Soybeans, Cowpeas, Velvet beans.	300 lbs. of 10-2-4.
Small grains.	300 to 500 lbs. 10-2-4 in fall, 100 lbs. of nitrate of soda or its equivalent, in Spring.
Alfalfa.	600 to 800 lbs. 10-2-4. 4,000 to 8,000 lbs. ground limestone.
Clovers and Lespedeza.	100 to 200 lbs. 16 per cent superphosphate (drilled in with seed), 2,000 lbs. ground limestone.

Varieties Recommended

Corn.	Southern Beauty, Cocke's, Weekley's, Biggs', Jarvis' (yellow), Indian Chief.
Cotton.	Mexican, Cleveland.
Soybeans.	For seed and pasture—Mammoth yellow, Herman, Tokio. For hay—Laredo, Virginia.
Cowpeas.	Brabham, Iron, Groit, Whipporwill, Black.
Velvet Beans.	Early Speckle, Osceola.
Wheat.	Fulcaster, Gleason, Purple Straw, Leap's.
Oats.	Fulghum, Appler, Lee.
Barley.	Tennessee No. 6, North Carolina.
Rye.	Abruzzi.
Red Clover.	Medium (middle western grown), Sapling.
Sweet Clover.	Biennial white, biennial yellow.
Lespedeza.	Common, Kobe, Tennessee 76, Korean.
Alfalfa.	Common (Kansas or Utah grown).

Pasture Mixtures

(1) For fertile sandy loam and clay loam soils with good drainage:

Kentucky blue grass	3 lbs.
Redtop	3 lbs.
White clover	2 lbs.
Orchard grass	8 lbs.
Tall oat grass	4 lbs.
Alsike clover	2 lbs.
Lespedeza	8 lbs.
Total per acre	30 lbs.

(2) For fertile sandy loam and clay loam soils which have only fair drainage:

Kentucky blue grass	3 lbs.
Redtop	3 lbs.
White clover	2 lbs.
Orchard grass	8 lbs.

Dallis grass	4 lbs.
Lespedeza	10 lbs.
Total per acre	30 lbs.

Meadow fescue or timothy may be substituted for Dallis grass at high elevations.

Area 8 includes Alleghany, Ashe, Watauga, Avery, Mitchell, Yancey, Madison, Buncombe, Henderson, Transylvania, Haywood, Jackson, Swain, Macon, Graham, Clay and Cherokee counties.

Area 8 covers all the territory from the Blue Ridge westward to the Tennessee line and is typical mountain country. There are high mountain ranges with steep hills and a small proportion of rolling upland and level stream bottoms in between. Most of the land is too steep, and rocky for cultivation, and much of that which is cleared might have been left in forest. The upland soils are mainly clay loams and clays, with silt loams, loams and sandy loams in the bottoms. On the steep lands, erosion is excessive, while many of the bottoms need better drainage.

This is essentially a livestock region, having large numbers of beef cattle, which are beginning to give way to dairy cattle. Sheep are as important as cattle in a few counties. Few hogs are kept.

Half of the cultivated land is planted to corn every year. While it is perhaps justifiable to grow this amount or even a greater proportion of corn on level bottoms, in a region where the amount of tillable land is so small in comparison to that unfit for cultivation, adequate provision should be made for economically maintaining the fertility of the soils.

There are many steep hillsides planted to corn on which the yields are, and always will be, low. Such lands should never have been cleared, but now should be sown down to grass and left for pasture.

Small-grains are considered important enough to be planted on one acre out of every six in cultivation in the area. As with corn, small grain is often grown on lands which are too steep for good results. Better fertilization, supplemented by suitable top-dressing, would greatly increase the yield of such crops.

The proportion of hay produced on the farms is much greater than in any other section of the State. In some counties, there is more land in pasture than in cultivation, all of which is due to the character of the land and to the suitability of the climate to cattle production. Most of the hay produced is from timothy or other grasses mixed with red clover. Clover formerly grew well without lime, but the soils finally became too acid, and long hauls over bad roads made liming in many cases impracticable. Now, however, good roads and motor trucks are making it feasible to apply at least 1,000 pounds per acre, and good results may be obtained from this amount.

In the same way, fertilizers which were often omitted in the past, may now be used to good advantage in most cases.

Good roads and trucks have also made it possible to market Irish potatoes, cabbage and other vegetables, and the growing of this type of crops might be increased to the advantage of many farmers.

Too little attention has been given to the growing of soybeans. The best of the fairly early varieties of this legume will make excellent hay and

seed yields. Planted with corn they will make a first class soil-improving crop combination for the area.

Suitable crop rotations will do a great deal toward putting these recommendations into effect. A few such are given below.

CROP ROTATIONS FOR AREA 8

1. **For Rolling Lands:**

First year.	Corn (for grain or silage) with soybeans (for seed and turning under) or soybeans (for hay). Wheat or other small grain in fall.
Second year.	Wheat or other small grain (for grain), clover and grass mixture drilled on grain in April.
Third year.	Clover and grass mixture (for hay).
Fourth year.	Clover and grass mixture (for grazing and turning under).

If enough land is available, the clover and grass might be left on the land from one to three years longer before turning under.

2. **For Bottom Lands:**

First year.	Corn (for grain or silage), crimson clover in fall (for turning under).
Second year.	Corn (for grain or silage), clover and grass mixture in fall.
Third year.	Clover and grass mixture (for hay or grazing).
Fourth year.	Clover and grass mixture (for grazing and turning under).

3. **For Bottom Lands:**

First year.	Corn (for grain or silage) with soybeans (for seed and turning under) or soybeans for hay. Wheat or other small grain in fall (for turning under).
Second year.	Wheat or other small grain (for grain). Crimson clover in fall (for turning under).

Irish potatoes or other truck crops may be substituted for part of the corn in all the above rotations, if desired.

Fertilizers Recommended per Acre

Corn.	300-500 lbs. 12-4-4.
Small grains.	300-400 lbs. 12-2-4 in fall; 100 lbs. nitrate of soda, or its equivalent, in spring.
Irish potatoes.	800-1,500 lbs. 7-5-5 or 8-4-6.
Soybeans.	300 lbs. 12-2-4 or 400 lbs. 10-2-4.
Clovers and grasses.	100 to 200 lbs. 16 per cent superphosphate drilled in with seed. 1,000-3,000 lbs. ground limestone.
Tobacco.	1,000 lbs. 10-4-6 (see page 40).

Varieties Recommended

Corn.	Holcomb's, Southern Beauty, Biggs', Jarvis (yellow).
Wheat.	Fulcaster, Leap's.

Barley.	Tennessee No. 6.
Oats.	For spring seeding—Fulghum, Burt, Richland.
Rye.	Abruzzi.
Soybeans.	For seed and pasture—Herman, Southern Prolific, Virginia, Laredo, Dixie.
	For hay—Virginia, Laredo (at low elevations).
Red Clover.	Medium (middle western grown), Sapling.
Sweet Clover.	Biennial White.
Lespedeza.	Korean.
Tobacco.	Burley.

Pasture Mixtures Recommended

(1) For fertile loamy soils with good drainage:

Kentucky blue grass	5 lbs.
Redtop	5 lbs.
White clover	2 lbs.
Orchard grass	8 lbs.
Tall oat grass	8 lbs.
Alsike clover	2 lbs.
Total per acre	30 lbs.

(2) For fertile loamy soils with only fair drainage:

Kentucky blue grass	5 lbs.
Redtop	6 lbs.
Orchard grass	8 lbs.
White clover	3 lbs.
Timothy	2 lbs.
Total per acre	24 lbs.

At low elevations, lespedeza may be added to either of these mixtures.

ESSENTIALS IN THE PRODUCTION OF MAJOR CROPS

CORN

Corn occupies more acres in the State than any other crop, and is exceeded in value only by cotton and by tobacco. It is the basis of livestock farming and is the one important crop which grows, and ordinarily yields well, in all sections of the State. Though considered a low-profit producing crop, most farmers find it more profitable to produce corn than to buy it. Livestock farming will not take a creditable position until the corn yield has been increased to where it takes less than one-third of the cultivated acreage to grow enough corn to supply the work animals of the farms.

The acreage in corn in each county is large enough, in some counties too large, to supply the respective needs provided the yields are increased to a creditable figure. But on many individual farms both the acreage and the yields must be increased.

Factors in Corn Production. A productive soil, good drainage, deep and thorough preparation of the seedbed, good seed of adapted, high-yielding

varieties, proper fertilization, and frequent shallow cultivation with efficient implements are factors which with slightly increased cost should lead to a doubling of the corn yield of the State.

Make Land Productive. Corn generally should be inter-cropped with either soybeans, cowpeas or velvet beans. The seed beans or peas produced may either be harvested or grazed and the vines turned under for soil improvement. When practical to do so, winter-growing legumes like hairy vetch, lespedeza, crimson, bur, red or sweet clover should be turned under ahead of the corn crop. Good drainage is essential for corn.

Preparation of Seed-bed. The corn crop requires a good supply of soil moisture to produce well and a seed-bed from five to nine inches deep is necessary to hold the soil-moisture. As a rule, level preparation and cultivation are preferable in corn culture, but there are cases in which it pays to plant on the bed to prevent injury from excess surface water.

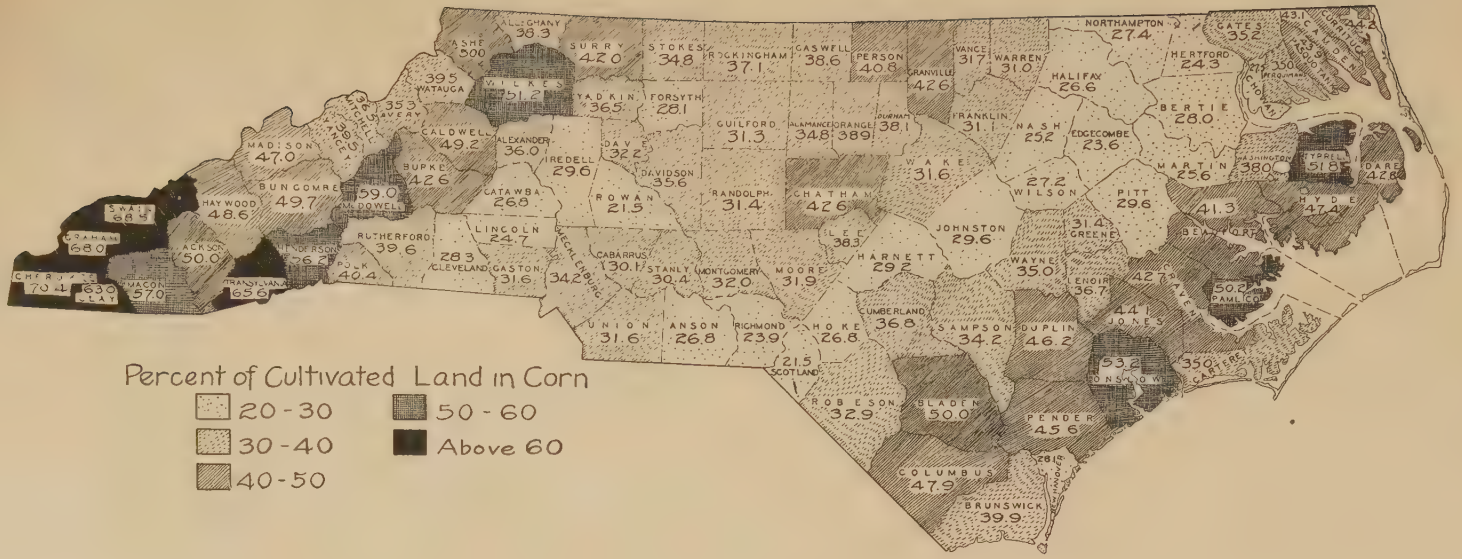
Good Seed of Adapted Varieties. Pure seed of adapted varieties produce from ten to twenty per cent more corn to the acre than the general run of crib-selected seed. Not every man can be a seed-breeder but nearly every man can purchase seed from a reputable breeder to plant a seed patch and can field select his seed. Seed ears should be selected only from those plants which come up to the standard, as to number of ears per plant and the type of plants. The start of this work is begun by procuring seed of a variety which is known to be adapted.

Fertilizing Corn. Corn uses large quantities of plant food to make good yields and returns a profit for fairly liberal application of the right kind of fertilizers. On light soils where leaching is common, it pays to divide the nitrogen, applying part of it as a side application. On soils where leaching does not occur to any great extent the whole fertilizer application may be applied before the crop is planted. The idea that corn must be stunted in order to produce the largest yield of grain is not borne out in practice.

Applying the phosphoric acid and potash before planting and a portion of the nitrogen as a side application is the more common practice. The side application should be made when the plants are from 12 to 24 inches tall. Late applications may cause the plants to turn green but contribute little in increased yields of grain.

Cultivation. Much of the cultivation should be given in the preparation of the seed-bed before the corn is planted and all later cultivation should be shallow and at intervals frequent enough to conserve the soil-moisture and to destroy grass and weeds. Cultivation should cease when the roots have taken possession of the top soil. Using the turning plow in the corn field should be finished before the crop is planted except in the rarest of cases. Barring off or hilling corn with a turning plow or cultivating the crop with other deep running root-pruning implements greatly reduces the yield and quality of the grain. In the cultivation of corn as in that of all row crops the use of two-horse riding cultivators should supplant the present one-horse system whenever practicable.

Distance to Plant. Corn should be planted in rows four to six feet apart, the latter to be used only when a row of beans or peas is to be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ROCKINGHAM 37.1
CASWELL 38.6
PERSON 40.8
VANCE 31.7
WARREN 31.0
NORTHAMPTON 27.4
GATES 35.2
HERTFORD 24.3
WILKES 51.2
YADKIN 36.5
FORSYTH 28.1
GRANVILLE 42.6
HALIFAX 26.6
BERTIE 28.0
WATAUGA 39.5
AVERY 35.3
CALDWELL 49.2
ALEXANDER 36.0
DAVIE 32.2
GUILFORD 31.3
ALAMANCE 34.8
ORANGE 38.9
DURHAM 38.1
FRANKLIN 31.
NASH 25.2
EDGECOMBE 23.6
MARTIN 25.6
WASHINGTON 38.0
TYRRELL 51.8
DARE 42.8
MADISON 47.0
BURKE 42.6
DAVIDSON 35.6
WAKE 31.6
27.2 WILSON
PITT 29.6
41.3
HYDE 47.4
BUNCOMBE 49.7
59.0 POWELL
HAYWOOD 48.6
CATAWBA 26.8
ROWAN 21.5
RANDOLPH 31.4
CHATHAM 42.6
SWAIN 68.4
GRAHAM 68.0
JACKSON 50.0
RUTHERFORD 39.6
LINCOLN 24.7
CLEVELAND 28.3
GASTON 31.6
CABARRUS 30.1
STANLY 30.4
MONTGOMERY 32.0
MOORE 31.9
HARNETT 29.2
JOHNSTON 29.6
31.4 GREENE
WAYNE 35.0
LENOIR 36.7
42.7
50.2 PAMLICO
CHEROKEE 70.4
CLAY 63.0
MACON 57.0
TRANSYLVANIA 65.6
POLK 40.4
LEGEND
UNION 31.6
ANSON 26.8
RICHMOND 23.9
HOKE 26.8
CUMBERLAND 36.8
SAMPSON 34.2
DUPLIN 46.2
44.1 JONES
53.2 ONSLOW
35.0 CARTERET
21.5 SCOTLAND
ROBESON 32.9
BLADEN 50.0
PENDER 45.6
COLUMBUS 47.9
BRUNSWICK 39.9
Percent of Cultivated Land in Corn
20 - 30
30 - 40
40 - 50
50 - 60
Above 60

planted between the corn rows. The plants should be from 12 to 24 inches apart in the drill, depending upon the productiveness of the soil. High-acre yields are produced not so much by prolificacy of varieties as by the increased numbers of plants per acre.

Harvesting the Crop. Regardless of the method used in harvesting corn, in no case should fodder pulling, top-cutting, and the like be practiced. The grain yields, for which the crop is mainly grown, will be reduced at least ten per cent by the use of any of these practices.

COTTON

Cotton is one of the three largest crops of the State, ranking next to corn in acreage, and although exceeded by the value of tobacco during the past year, is usually the largest single source of farm income. The cotton acreage has shifted somewhat from the lower Coastal Plain counties to larger planting in the upper Coastal Plain and Piedmont regions.

The maximum acre yields of cotton in the State are high though the average is far too low largely due to planting on land unsuited for the crop. Land which yields less than one-half of a bale to the acre during a normal season should be planted to other crops. This can be done with an increase in the net returns from the crop.

Important Factors in Cotton Culture. More attention should be given to the selection, preparation and fertilization of the soil, closer spacing and better cultivation of the crop, the use of good seed of adapted varieties and the production of high quality lint.

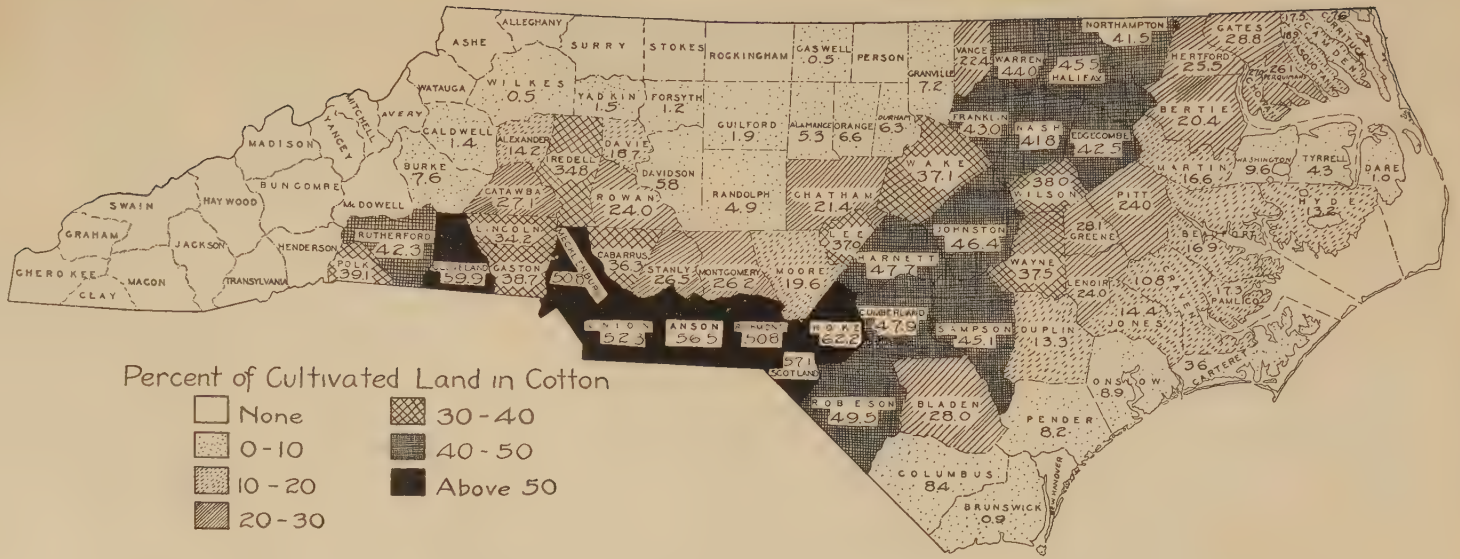
Best Soils for the Crop. Cotton does best on friable, fertile and well-drained sandy or clay loam soil, but may be produced profitably on a variety of soil types that are well-drained and well-supplied with vegetable matter and available plant food constituents in the proper proportions and amounts. Soils which are poorly drained, warm up late in the spring, are cold and wet natured should not be used for this crop.

Soil Preparation. The seed-bed for cotton should be thoroughly prepared. The depth to break the land is determined by the nature of the land and its previous treatment. As a rule, it should be broken six to eight inches deep. Discing and harrowing to thoroughly prepare the seed-bed before planting counts well toward a successful crop.

Distance of Planting. Cotton should be planted in rows three to four feet apart, the wider rows to be on the more fertile soils, where cotton grows tall and has a tendency to shut out too much sunlight. Close planting tends to reduce weed growth and to hasten maturity. Spacing in the drill should be from 8 to 10 inches and with one to three plants to the hill.

Cultivaion. The cultivation of the crop should start by the time the plants are up and continue at frequent intervals until the plants are too large to cultivate without injury. Implements which run only to a shallow depth covering the land rapidly, and cultivating one or two rows at a time are best, and the most economical on lands where their use is practical.

Varieties. More than two-thirds of the cotton used annually by North Carolina cotton mills is of 15-16 inch or longer staple but less than one-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SURRY
STOKES
ROCKINGHAM
CASWELL .5
PERSON
VANCE 22.4
WARREN 44.0
NORTHAMPTON 41.5
GATES 28.8
HERTFORD 25.5
455 HALIFAX
GRANVILLE 7.2
WATAUGA
WILKES .5
YADKIN 1.5
FORSYTH 1.2
MITCHELL
AVERY
YANCEY
CALDWELL 1.4
ALEXANDER 14.2
IREDELL 34.8
DAVIE 18.7
GUILFORD 1.9
ALAMANCE 5.3
ORANGE 6.6
DURHAM 6.3
FRANKLIN 43.0
NASH 41.8
EDGECOMBE 42.5
BERTIE 20.4
MADISON
BURKE 7.6
DAVIDSON 5.8
WAKE 37.1
380 WILSON
WASHINGTON 9.6
TYRRELL 4.3
DARE 1.0
MARTIN 16.6
BUNCOMBE
SWAIN
HAY WOOD
McDOWELL
CATAWBA 27.1
ROWAN 24.0
RANDOLPH 4.9
CHATHAM 21.4
PITT 24.0
HYDE 3.2
GRAHAM
JACKSON
HENDERSON
RUTHERFORD 42.3
LINCOLN 31.2
LEE 37.0
JOHNSTON 46.4
281 GREENE
BEAUFORT 16.9
CHEROKEE
MACON
TRANSYLVANIA
POLK 39.1
CLEVELAND 59.9
GASTON 38.7
CABARRUS 36.3
STANLY 26.5
MONTGOMERY 26.2
MOORE 19.6
HARNETT 47.7
WAYNE 37.5
LENOIR 24.0
108.9
17.3 PAMLICO
14.4 JONES
CLAY
UNION 52.3
ANSON 56.5
MECKLENBURG 50.8
IREDELL 62.2
CUMBERLAND 47.9
SAMPSON 45.1
DUPLIN 13.3
36 CARTERET
57.1 SCOTLAND
ROBESON 49.5
BLADEN 28.0
ONSLOW 8.9
PENDER 8.2
COLUMBUS 8.4
BRUNSWICK 0.9
Percent of Cultivated Land in Cotton
None
0-10
10-20
20-30
30-40
40-50
Above 50

third of that produced in the State is of this staple. This means that about 2-3 of the cotton manufactured here is shipped in from other states and about 2-3 of the North Carolina crop, because of inferior staple, is shipped to other states and countries for manufacturing.

It is important to use pure viable seed of an adapted variety, which produces a uniform staple of 15-16 inch to 1 1-16 inches in length. Such staple commands a premium on the best markets. Best results are to be secured when only one variety to the community, or better, one variety to a whole county, is grown.

The quality of the cotton can be raised one or two grades by better care in harvesting and ginning. Cotton should be picked before the crop has been storm damaged, and the gin should be run in such a manner as not to cut the fibers.

Care should also be taken to keep seed pure at the gin. The roll should be removed and all other seed cleaned from the machinery before starting to gin the seed cotton.

TOBACCO

The tobacco crop has been one of the large money crops for a number of years in North Carolina. This crop has always paid a profit per acre when of good quality and when handled properly. Quality cannot be over emphasized in growing tobacco for the market. The following factors influence both yield and quality of tobacco in the State:

1. Varieties of tobacco suited to the market conditions is of first consideration. The flue-cured or bright varieties that give best results are, Cash, White Stem Orinoco, Jamaica and Bonanza. With the burley or air-cured types, the best varieties are Kelleys and Judies Pride. Both of these should be resistant to root-rot.

2. Selection and preparation of the soil for the seed-beds and fields is important. Well-drained soils of a loamy type are best suited for tobacco. Crops grown the year previous govern the earliness of preparation required. If a previous crop is to be turned under, it should be done during the fall; if a green manure crop is to be turned under, it should be done in the late winter or early spring. All soils should be well pulverized before fertilizer is applied.

3. The sources of plant food constitutes are of prime importance. They should be as follows:

Phosphoric acid derived from superphosphate.

Ammonia. One-half of the ammonia should be derived from high grade organic materials of plant or animal origin, such as cotton seed meal, fish scrap, and high grade tankage. The remaining half should be derived from urea and standard inorganic sources of nitrogen, such as nitrate of soda and sulphate of ammonia, at least one-fourth of the total ammonia being supplied by nitrates.

Potash. Potash should be derived from a combination of high grade muriate of potash with either high grade sulphate of potash or sulphate of potash-magnesia, or both.

The total chlorine content of tobacco fertilizer should be but two per cent.

Percent of Cultivated Land in Tobacco
None
0 - 5
5 - 10
10 - 20
20 - 30
Above 30
CURRITUCK
CAMDEN
PASQUOTANK
GATES
HERTFORD
PERQUIMANS
CHOWAN
DARE
TYRRELL
HYDE
BERTIE
MARTIN
BEAUFORT
PITT
GREENE
WASHINGTON
TERRELL
NORTHAMPTON
HALIFAX
NASH
EDGECOMBE
WARREN
FRANKLIN
GRANVILLE
VANCE
WAKE
JOHNSTON
LENOIR
WAYNE
JONES
PAMLICO
CRAVEN
DUPLIN
ONSLOW
PENDER
HARNETT
LEE
CHATHAM
SAMPSON
CUMBERLAND
ROBESON
BLADEN
COLUMBUS
BRUNSWICK
MOORE
RANDOLPH
RICHMOND
SCOTLAND
ANSON
UNION
STANLY
MONTGOMERY
DAVIDSON
DAVIE
IREDELL
ROWAN
CABARRUS
MECKLENBURG
GUILFORD
ALAMANCE
ORANGE
PERSON
CASWELL
ROCKINGHAM
SURRY
STOKES
FORSYTH
ALLEGHANY
WILKES
YADKIN
ASHE
WATAUGA
AVERY
MITCHELL
YANCEY
MADISON
CALDWELL
ALEXANDER
CATAWBA
BURKE
LINCOLN
GASTON
CLEVELAND
RUTHERFORD
McDOWELL
POLK
BUNCOMBE
HENDERSON
TRANSYLVANIA
HAYWOOD
JACKSON
SWAIN
GRAHAM
MACON
CLAY
CHEROKEE

The magnesia content of the fertilizer should be at least two per cent. This may be derived from sulphate of potash-magnesia, dolomitic limestone, or any other materials carrying magnesia in forms known to be available to the plant.

4. **Cultivation.** The feed-roots of tobacco grow in a different manner from those of other staple crops, therefore the cultivation must be somewhat different for best results. This crop requires the ridge cultivation.

5. **Curing and Handling Tobacco** is the last step before marketing. Care must be taken to get the tobacco from the field in the right condition, not allowing it to be bruised or crowded in the barn. It should not be allowed to take up too much moisture after it is cured as this allows mold to set in or the tobacco will change to a cherry red color. If packed down with the right amount of moisture in the leaf, the aroma and color will improve and the market value will be increased.

PEANUTS

North Carolina is an important peanut producing center, more than one-fourth of the American crop being grown in a relatively small number of counties in the northeastern part of the state. The acreage devoted to this crop has been increased until more than 30 per cent of the cultivated acreage in a number of counties, mainly of region 3, is now regularly planted to peanuts.

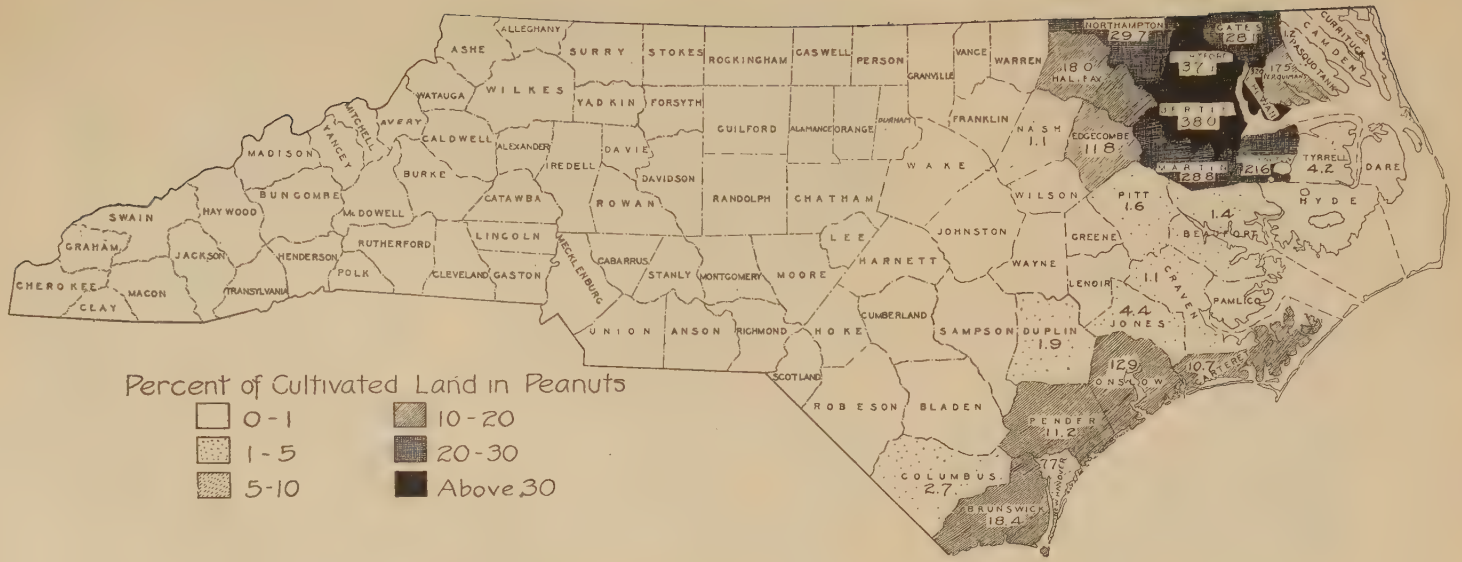
The large seeded types, such as Jumbo Runner and Virginia Bunch, are grown extensively in the leading peanut counties. These varieties produce most of the fancy stock for roasting in the shell, and also the large shelled nuts known as Extra Large Virginia Shelled and No. 1 Shelled. A large percentage of the imported nuts are sold as these grades. It seems advisable that farmers continue to plant about the same acreage of Jumbo Runners and plant the large Virginia Bunch instead of the smaller seeded varieties. No increase in acreage seems advisable at the present time.

Good seed, free from variety mixture and uniform as to size and quality are very important in the production of nuts of high quality. The germination of peanuts is often low being very easily damaged in storage. A germination test of planting stock is advisable. There is a great need at the present time for improved strains of recommended varieties. High yielding strains of good quality would greatly increase the per acre value of the crop.

Greater care should also be exercised in digging, stacking, threshing and storage.

The sandy soils of the Norfolk and Coxville series seem to be especially adapted to the production of nuts of high quality. When produced as a money crop, the tops as well as the nuts are usually taken off of the land. Thus, without proper fertilization these sandy and silty soils will rapidly become unproductive. Peanuts like other legumes, when grown on acid soils respond to application of lime, the amount of lime best to use depending upon the acidity of the soil.

In the southeastern part of the state, peanuts are grown primarily for hogging-off. When handled in this manner, peanuts grown either as an


Percent of Cultivated Land in Peanuts
0-1
1-5
5-10
10-20
20-30
Above 30
ALLEGHANY
ASHE
SURRY
STOKES
ROCKINGHAM
CASWELL
PERSON
VANCE
WARREN
GRANVILLE
WATAUGA
WILKES
YADKIN
FORSYTH
GUILFORD
ALAMANCE
ORANGE
DURHAM
FRANKLIN
NASH
1.1
MITCHELL
AVERY
YANCEY
MADISON
CALDWELL
ALEXANDER
DAVIE
REDELL
DAVIDSON
WAKE
EDGECOMBE
118
NORTHAMPTON
297
GATES
128
HALIFAX
180
WILSON
PITT
1.6
MARTIN
288
216
TYRRELL
4.2
DARE
HYDE
1.4
BEAUFORT
BURKE
CATAWBA
ROWAN
RANDOLPH
CHATHAM
SWAIN
HAYWOOD
BUNCOMBE
McDOWELL
GREENE
JOHNSTON
GRAHAM
JACKSON
HENDERSON
RUTHERFORD
LINCOLN
MECKLENBURG
CABARRUS
STANLY
MONTGOMERY
MOORE
LEE
HARNETT
WAYNE
LENOIR
CRAVEN
1.1
CHEROKEE
MACON
CLAY
TRANSYLVANIA
POLK
CLEVELAND
GASTON
PAMLICO
4.4
JONES
UNION
ANSON
RICHMOND
HOKE
CUMBERLAND
SAMPSON
DUPLIN
1.9
SCOTLAND
ROBESON
BLADEN
PENDER
11.2
129
ONSLOW
10.7
COLUMBUS
2.7
BRUNSWICK
18.4
17

intercultural crop with corn or alone, may aid slightly in increasing the fertility of the soil.

SMALL GRAINS

The total acreage devoted to small grains in the state, exclusive of cover crops, is slightly less than one million acres, approximately one-half of this amount being in wheat, followed in importance by oats, rye and barley in the order given. Wheat is grown almost exclusively for human consumption. Oats and barley are either cut for hay or the grain is harvested and fed to livestock. Rye is grown for cover crop, pasturage and seed. Seed production of small grains, particularly of wheat, is not usually profitable, due to low acre yields.

The production of small grains should not be abandoned but the yield per acre should be materially increased. This may be brought about by growing on soils well adapted to small grains. The use of better systems of crop rotation, proper fertilization, and of improved seed of adapted varieties are all essential. Thorough preparation of the seed-bed is very important. Soil building crops should be seeded with or after the small grains whenever possible.

SOYBEANS, COWPEAS AND VELVET BEANS

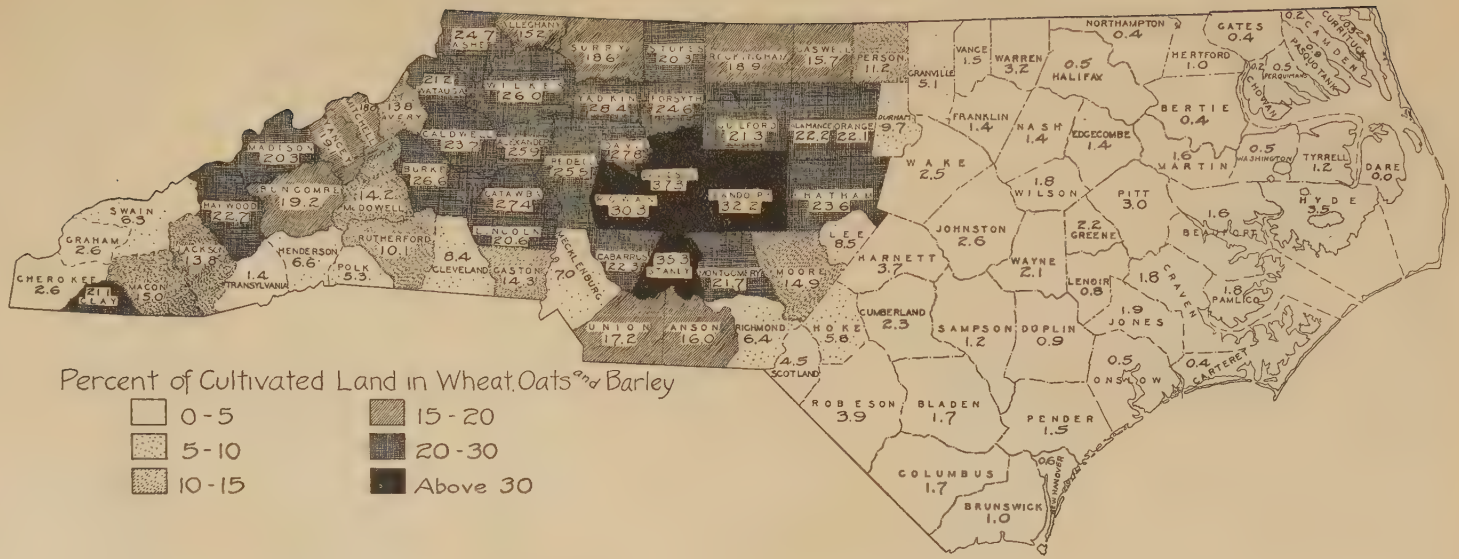
These crops are the most valuable summer legumes for hay, soil improvement and temporary pasture. Farmers of the state buy large quantities of hay at high prices from the western states when they might easily produce sufficient for their own needs by growing a few acres of soybeans or cowpeas.

With the exception of a few counties which produce the bulk of the soybean seed-crop, the total acreage of soybeans and cowpeas for all purposes ranges from less than 1 per cent to 15 per cent of the total cultivated acreage. While in these same counties, the per cent of the total cultivated acreage in corn varies from 21 to 70 per cent. These soil-improving crops will fit into almost any system of crop rotation. They may be planted on lands that would otherwise lie idle during the year or be planted after small grain, truck crops, spring hay crops, or planted in corn. One of these crops should be planted with corn either in the same row or between six-foot rows.

Many farmers plant legumes for soil improvement, using little or no fertilizer. In the fall the crop looks too good to turn under and they cut it off for hay. This practice leaves the soil in poor condition.

Soybeans. This crop does well on most well-drained soils, but on very poor soils cowpeas or velvet beans generally do better. Lime is beneficial to soybeans on most soils which are quite acid. A well prepared seed-bed is important, better germination will be secured, plants will grow off better, and grass and weeds will give less trouble while the plants are small. Maximum growth is usually secured when plantings are made between May 1 and June 1, but a fairly good growth is often secured from June plantings.

For hay production, soybeans may be sown broadcast or be planted in 24 to 36-inch rows. If weeds and grass are bad, larger yields of hay of


Percent of Cultivated Land in Wheat, Oats and Barley
0-5
5-10
10-15
15-20
20-30
Above 30
ALLEGHANY 15.2
ASHE 24.7
WATAUGA 12.6
WILKES 13.8
AVERY 13.8
MITCHELL 19.7
YANCEY 19.7
MADISON 20.3
BURKE 26.6
CALDWELL 23.7
ALEXANDER 23.9
CATAWBA 27.4
IREDELL 25.6
SURRY 18.6
STOKES 20.3
YADKIN 28.4
DAVIE 27.8
FORSYTH 24.6
ROCKINGHAM 18.9
GUILFORD 21.3
ALAMANCE 22.2
ORANGE 22.2
DURHAM 9.7
CASWELL 15.7
PERSON 11.2
GRANVILLE 5.1
VANCE 1.5
WARREN 3.2
FRANKLIN 1.4
NASH 1.4
WAKE 2.5
HALIFAX 0.5
NORTHAMPTON 0.4
GATES 0.4
HERTFORD 1.0
PERQUIMANS 0.5
CHOWAN 0.2
CURRITUCK 0.2
CAMDEN 0.3
PASQUOTANK 0.3
EDGECOMBE 1.4
BERTIE 0.4
MARTIN 1.6
WASHINGTON 0.5
TYRRELL 1.2
DARE 0.0
HYDE 2.5
WILSON 1.8
PITT 3.0
GREENE 2.2
BEAUFORT 1.6
JOHNSTON 2.6
WAYNE 2.1
LENOIR 0.8
CRAVEN 1.8
PAMLICO 1.8
JONES 1.9
ONSLOW 0.5
CARTERET 0.4
LEE 8.5
HARNETT 3.7
CUMBERLAND 2.3
SAMPSON 1.2
DUPLIN 0.9
PENDER 1.5
BLADEN 1.7
ROBESON 3.9
SCOTLAND 4.5
HOKE 5.8
RICHMOND 6.4
MOORE 14.9
MONTGOMERY 21.7
STANLY 35.3
UNION 17.2
ANSON 16.0
COLUMBUS 1.7
BRUNSWICK 1.0
NEW HANOVER 0.6
CABARRUS 22.3
CHARLOTTE
LINCOLN 20.6
GASTON 14.3
CLEVELAND 8.4
RUTHERFORD 10.1
POLK 5.3
HENDERSON 16.6
TRANSYLVANIA 1.4
BUNCOMBE 19.2
MCDOWELL 14.2
HAYWOOD 22.7
JACKSON 13.8
SWAIN 6.3
GRAHAM 2.6
CHEROKEE 2.6
CLAY
MACON 5.0
70
ASHEVILLE
SALISBURY
STATESVILLE
MOUNT AIRY
HICKORY
MORGANTON
NEWTON
LENOIR
WILKESBORO
ELKIN
SPARTANBURG
GREENVILLE
GREENSBORO
RALEIGH
DURHAM
FAYETTEVILLE
WILMINGTON
ROCKY MOUNT
GOLDSBORO
KINSTON
NEW BERN
ELIZABETH CITY
EDENTON
WASHINGTON
MANTEO
ATLANTIC OCEAN

better quality will be obtained when planted in rows and cultivated two to three times. By using the best hay varieties, cutting at the proper stage of maturity, and curing properly, a hay about equal in feeding value to alfalfa hay may be secured.

Soybeans for seed should be planted in 30 to 36 inch rows. Commercial production of soybean seed is not advised for the Piedmont section, but every farmer should produce enough seed for his own uses.

For soil improvement, soybeans may be sown broadcast after small grain, planted in the same row with corn or between six-foot corn rows. Soybeans seldom make much growth when sown broadcast in corn at the last cultivation, except in the lower Coastal Plain section. This crop makes a valuable pasture for hogs, sheep and cattle.

Cowpeas. The uses and adaptations of cowpeas are about the same as for soybeans, except that the former crop will usually make a better growth on poor land and when sown broadcast in corn will make considerable seed and fair growth for pasture or for turning under. The soils of a large area of the state are infested with cowpea wilt. For these conditions, only wilt-resistant varieties should be planted, and in view of the fact that the best of these yield about as well as other varieties it is perhaps the safest policy to plant only wilt-resistant varieties in the state.

Velvet Beans. The principal use of this crop is for soil improvement. On poor sandy soils they will make more growth for turning under than most any other summer legume. When planted in corn, it is advisable to plant the corn in six-foot rows with a row of velvet beans between. After the corn has been harvested, the velvet beans may be pastured during the winter. Cattle will eat the pods and dead leaves readily. The pods do not rot easily and will furnish much pasturage during December and January, when other pasturage is usually short.

HAY CROPS

Outside of a few small sections, there is need for increasing the acreage devoted to hay crops in this state. Excepting the acreage devoted to cowpeas and soybeans for hay, which is none too large, the area in hay crops in a large number of counties is below five per cent of the total cultivated land.

The number of hay crops which can be grown profitably, in the state includes many valuable ones. All of these are not adapted to one section but there is not a region of the state in which two or more hay crops may not be profitably grown. Not only should there be an increase in the acreage of hay in most sections, but also an increase in the yield and an improvement in the quality. This last should be accompanied by more efficient harvesting, curing and storing methods, to reduce waste and lower costs.

ALFALFA

Alfalfa hay stands at the top of the list in quality. The value of alfalfa to livestock farmers in general and especially to the dairy farmer is recognized. The planting of this crop in North Carolina is increasing and as men learn more of how to grow the crop greater acreages may be seeded.

Percent of Cultivated Land in Soybeans and Cowpeas
0-2
2-5
5-10
10-15
15-20
Above 20

Soils. Of the soils in North Carolina on which alfalfa may be successfully grown, the deep dark red clay (Davidson) soils of the Piedmont region are best suited to its culture. This crop may be made to grow well on any soil in which there is considerable clay, provided the soil is well drained, moderately fertile and well supplied with lime and the proper fertilizer.

Lime and Fertilizers. To grow alfalfa, apply two to four tons of ground limestone and 600 to 800 pounds of a fertilizer analyzing 10-2-4 per acre. If one-half or two-thirds of the lime is applied three to six months ahead of the seeding date, the results will be best.

Seeding and Kind of Seed. The common variety grown in Kansas or Utah seems to be best suited to North Carolina conditions. Early fall seeding will usually give best results.

Inoculation. Inoculation is essential except on land on which either alfalfa, sweet or bur clovers have been grown successfully.

Precaution. Alfalfa will not succeed on poor, unlimed, or wet soils. Half-way measures will not make it. This is one of our most valuable hay-producing crops and thorough preparation for its production will pay well.

SWEET CLOVER

Sweet clover is a close relative of alfalfa and like alfalfa requires lime on all soils not already fairly rich in this constituent. In preparation for this crop on land that has not been limed recently, apply one ton of ground limestone per acre. Where less than a ton of lime per acre is used on sweet clover, the results secured with the crop will be in keeping with amount used.

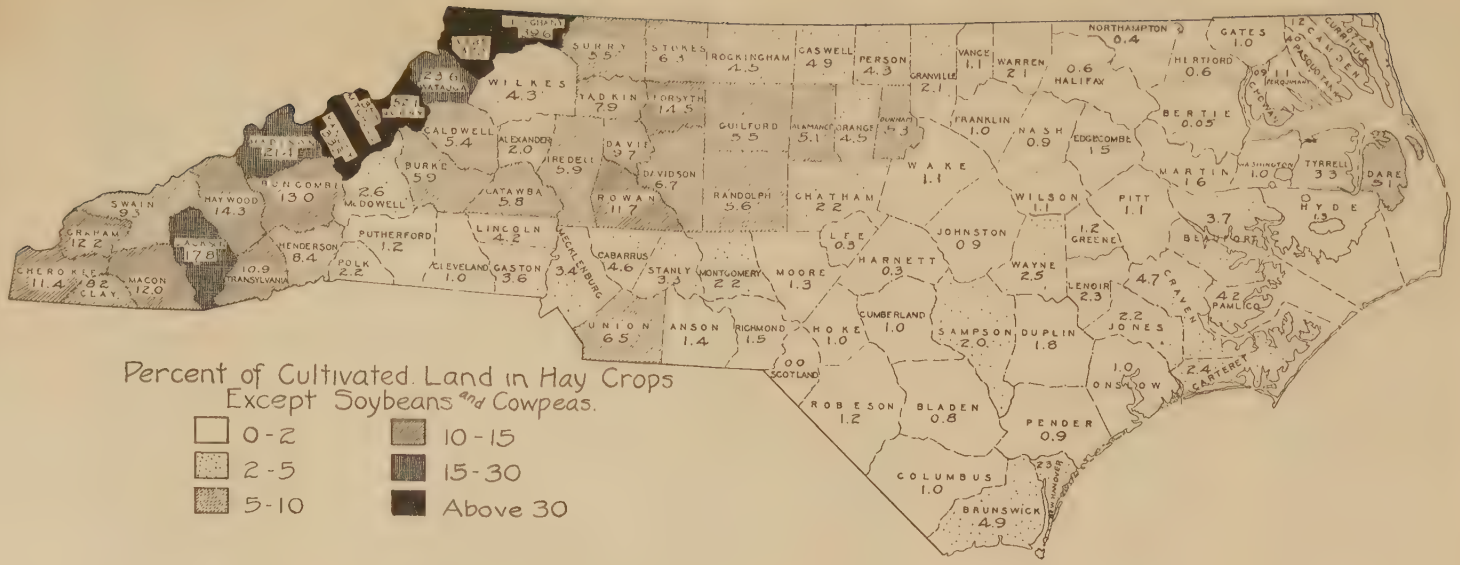
Inoculation. With sweet clover, as with alfalfa, inoculation is essential except for lands on which either alfalfa, sweet or bur clovers have been grown successfully.

With Other Crops. It is a good plan to seed sweet clover with a light seeding of white clover and lespedeza. The sweet clover is usually cut for hay the first fall after seeding and these other crops will add to the value of the hay. When the crop is grazed, white clover and lespedeza will also add much to the value of the pasturage.

Fertilizers. Although sweet clover may be planted alone, sowing on small grain crops is the more common practice. An application of 300 to 400 pounds of a fertilizer mixture analyzing about 10-2-4 should be used on each acre where fertilizers have not been applied for the grain-crop or where the sweet clover is seeded alone.

Seeding and Seed-bed. Use fifteen to twenty pounds of seed per acre. Land prepared for and seeded to fall-sown grain offers ideal conditions for success with this crop. Under these conditions, seed in late February or early in March on the small grain.

Kinds of Sweet Clover. There are two kinds of sweet clover commonly grown, the white-blooming and the yellow-blooming. The white-blooming is more hardy, ranker, larger growing and better adapted to land on which sweet clover has not been grown heretofore. The yellow-blooming species produces finer forage than the white blooming.


Percent of Cultivated Land in Hay Crops
Except Soybeans and Cowpeas.
0-2
2-5
5-10
10-15
15-30
Above 30
ASHE 2.6
WATAUGA 2.3
WILKES 4.3
SURRY 5.5
STOKES 6.1
ROCKINGHAM 4.5
CASWELL 4.9
PERSON 4.3
VANCE 1.1
WARREN 2.1
NORTHAMPTON 0.4
GATES 1.0
CHOWAN 1.1
PERQUIMANS
PASQUOTANK
CAMDEN
CURRITUCK
HERTFORD 0.6
HALIFAX 0.6
BERTIE 0.05
MADISON 21.1
YANCEY
MITCHELL
CALDWELL 5.4
ALEXANDER 2.0
IREDELL 5.9
DAVIE 3.7
DAVIDSON 6.7
GUILFORD 5.5
ALAMANCE 5.1
ORANGE 4.5
DURHAM 5.3
FRANKLIN 1.0
NASH 0.9
EDGECOMBE 1.5
MARTIN 1.6
WASHINGTON 1.0
TYRRELL 3.3
DARE 5.1
HYDE 1.3
BUNCOMBE 13.0
2.6
McDOWELL
BURKE 5.9
CATAWBA 5.8
ROWAN 11.7
RANDOLPH 5.6
CHATHAM 2.2
WAKE 1.1
WILSON 1.1
PITT 1.1
GREENE 1.2
BEAUFORT 3.7
SWAIN 9.3
HAYWOOD 14.3
GRAHAM 12.2
MACON 12.0
CLAY 9.2
CHEROKEE 11.4
TRANSYLVANIA 10.9
HENDERSON 8.4
POLK 2.2
RUTHERFORD 1.2
LINCOLN 4.2
CLEVELAND 1.0
GASTON 3.6
CHESTER
CABARRUS 4.6
STANLY 3.3
MONTGOMERY 2.2
MOORE 1.3
LEE 0.3
JOHNSTON 0.9
HARNETT 0.3
WAYNE 2.5
LENOIR 2.3
4.7
CRAVEN
PAMLICO 4.2
UNION 6.5
ANSON 1.4
RICHMOND 1.5
HOKE 1.0
CUMBERLAND 1.0
SAMPSON 2.0
DUPLIN 1.8
JONES 2.2
ONSLOW 1.0
CARTERET 2.4
SCOTLAND
ROBESON 1.2
BLADEN 0.8
PENDER 0.9
COLUMBUS 1.0
BRUNSWICK 4.9

Care of the Crop. The first year's crop may be grazed lightly or mown in the early fall for hay. The plant is a biennial, the roots living over winter, and the crop making its maximum growth and producing seed in the spring and early summer of the second year. The second year's crop may be grazed, cut for hay, turned in for soil improvement or be allowed to produce a seed-crop. As a soil-improving crop, sweet clover takes high rank. It also ranks high as a money crop.

RED CLOVER

Red clover has long been a fairly important crop in Central and Western North Carolina. It ranks among the best as a crop for hay, for soil improvement and for use as a cover crop. It has the advantages of requiring very little labor in sowing, and of remaining on the land two years instead of one, yielding good returns both years. Its disadvantage is that it is rather exacting as to soil requirements.

On fertile soil, well limed, one and one-half to two tons of hay per acre may usually be expected at each cutting. The hay is fine in texture and quality, so that livestock will eat the whole of it.

Soils. Red Clover does best on a fairly heavy soil, and is grown most extensively on red clays and clay loams of the Piedmont section. However, good results are frequently obtained on sandy loam soils. The soil should be of moderate fertility or better. Many fields have made good crops of clover for a few years, then each succeeding crop has become poorer until finally a complete crop failure. This is frequently because the repeated growing of clover on the same land has exhausted the lime supply of the soil. Red clover will tolerate less soil acidity than most other crops. If an application of ground limestone at the rate of one or one and a half tons per acre is made where the clover has failed, the next crop will usually be much better than the one has been before.

Sources of Seed. While it is a good policy to use only the best seed for all crops, this is specially true with red clover. Many failures have resulted from the use of poor or unadapted seed. The seed which have given best results in experiments by the Department of Agronomy have come from the Mid-Western states,—Ohio, Michigan Indiana, Illinois and others. Seed from this region are generally more resistant to disease and give uniformly better results than those from other sources.

Red clover is nearly always seeded in March, on small grain with a grain drill.

ALSIKE CLOVER

Alsike clover is very much like red clover in its habits of growth and soil requirements, except that it is more tolerant to acidity of the soil and will stand more water in the soil. It stands trampling when grazed better than red clover, but does not yield as much hay when the conditions are right for the latter.

Both red and alsike clover are used with excellent results in grass hay mixtures. The inclusion of these clovers not only increases the quality of the hay, but the yield.

LESPEZEDA

Lespedeza, or Japan clover, was long known as a weed. The cultivated strains generally grow much larger than the wild kind. The larger growing strains, introduced into this State about ten years ago, may now be rated as a standard crop. They are used in crop rotations to supplement red clover, and are popular as a crop for hay, pasturage and soil improvement.

Lespedeza is an annual, making no growth until warm weather, and is killed by the first heavy frost.

Soils. Lespedeza will grow well on almost any soil, but it is most widely grown on the slate soils of the Alamance and Georgeville series. It makes its best growth when well supplied with moisture. On very dry soils, especially if poor, it will hardly grow high enough to cut for hay, but will even there furnish considerable pasturage, reseed itself, and improve the soil.

Lespedeza will make satisfactory growth on most soils without an application of lime, it needing lime apparently much less than either red or sweet clover. On soils where soybeans respond to lime, it will however pay to use some for Lespedeza.

Uses. This crop makes a first-class hay which is high in feed value, easily cured and with little waste. On bottom lands, or on uplands in favorable seasons, the yield sometimes runs above two tons per acre. Ordinarily about one ton per acre may be expected. A thick growth, ten inches high, will yield this amount if cut in September and leave enough stubble to reseed the field.

It is also excellent for grazing. It should be in all pastures east of the Blue Ridge Mountains. It is at its best during the hot summer and early fall months when most pasture plants are fairly dormant.

For soil improvement, Lespedeza will give as good results as an equal growth of either hairy vetch, crimson clover, cowpeas, soybeans, red clover or other legumes.

Varieties. The common Lespedeza, the kind most generally grown, is hardier and more persistent than others, and is probably the best general purpose sort to use generally.

The Kobe and Tennessee No. 76 are taller, more erect, and finer stemmed than the common variety and are well adapted to hay-making.

The Korean lespedeza is at least a month earlier than the common lespedeza, making an earlier summer growth, and maturing seed in September. For this reason, it is good for early summer-grazing, but is of little value during late fall. It makes good yields of hay, and is well adapted to the Mountain section of the State.

TIMOTHY AND HAY GRASSES

In the Mountain and upper Piedmont counties of the State, there are many meadows which are more than forty years old from which the yields of hay are still high. But in far too many cases, the meadow soils in these sections have become low in plant food and are sour, due to the continuous removal of the annual growth and to the return of neither plant food nor

lime with which to replenish the needs of the soils. The stand of grasses under such conditions is poor, the weed growth is abundant and both the quantity and quality of hay is low. In other meadows, a volunteer growth of redtop is getting the upper hand due to conditions unfavorable to timothy.

The hauling of lime and fertilizers is not the problem it once was and meadow soils which are too low in plant food to produce good hay yields should be given an application of ground limestone and mixed fertilizers supplemented by top-dressing of soluble forms of nitrogen. Such treatment for meadows, when it is needed, will profitably increase both the quantity and quality of hay.

Meadows in which the stand of grasses has become thin and in which weeds have taken the upper hand should be worked to cultivated crops for a year or two before being but back into sod.

In many sections, there is an unwarranted prejudice against redtop or Herd's grass, in timothy meadows. Redtop is more tolerant to soil acidity than timothy and often insures a full crop where only a small part of a crop would be secured with timothy alone. Furthermore, redtop is of as high feed value as is timothy.

OTHER GRASSES

Mixtures of orchard grass, tall oat grass, redtop and red and alsike clovers, will give better yields and higher quality hay in much of the lower mountain and upper Piedmont regions than timothy. A variety of grasses and clovers will usually produce a heavier yield than any single one. Redtop is the only sod grass recommended for hay, preference being given to the bunch and semi-sod grasses for this purpose.

In the Coastal Plain region, hay grasses are not recommended for usual conditions, though there are many valuable meadows in this section. Preference is given to oats, a mixture of oats and barley with hairy vetch of crimson clover to be followed with soybeans, cowpeas or lespedeza, Sudan grass or millet for hay. The yields of hay from these crops will be larger under most conditions.

SUDAN GRASS AND MILLETS

Sudan grass, German and Japanese millets are well adapted as emergency hay crops. All three yield best on fairly moist fertile soils and respond well to liberal applications of manure, commercial fertilizers and to top-dressing with a quick-acting form of nitrogen.

Sudan grass may be sown either broadcast at the rate of 20 pounds of seed per acre or in three-foot rows at the rate of 4 to 6 pounds per acre. It produces excellent grazing, stands well under trampling or it may be mown from two to four times per season. The hay is of good quality as regards feed value and is fairly easily cured. The first mowing may be made about 60 to 70 days after seeding.

German and Japanese millets should be seeded broadcast at the rate of 25 pounds of seed per acre. Thick seeding produces small stems and a finer

quality of hay. The German millet may be seeded at any time after danger of late spring frost is past up to August 1. The crop usually requires about 70 days to mature for hay-making.

For Japanese millet late March or early April seeding is best and is less adapted to mid-summer use. Crop matures usually in about 55 days.

Either of these crops will yield under favorable conditions a ton or more of cured hay per acre.

PASTURE

The relation of acreage of plowable land in pasture to that in cultivated crops in each county gives only a fair index of the available pasturage in different parts of the State. However, to say that there is one, five, ten or a hundred per cent as much plowable land in pasture in a county as there is in cultivated crops may not be accurate, for it is a fact that in far too many cases there is little of it worthy of the name pasture. Yet this is the best means available for showing how little pasture there is in the state and serves as a fair working basis.

Pasture furnishes one of the best and cheapest feeds for all livestock

Value of Pasture. Pasture, when properly planned and used, furnishes one of the best and cheapest feeds for livestock. It offers a good means for utilizing profitably much of the land now idle, provides a method for conserving soils and soil fertility against loss by erosion and leaching and adds to the aesthetic value of the farm. Good pasture has a feed replacement value of forty to sixty dollars per cow per year, and is equally valuable

for other classes of livestock. Permanent pasture is the foundation for successful and economical livestock production.

Land for Pasture. On most farms there is sufficient land available for producing adequate pasture for all the livestock kept, including the work animals, without interfering with the land now profitably planted to other crops. Three classes of land which should be considered first for sod are: (1) lands which are either too wet, rough or steep for cultivated crops; (2) cutover lands; and (3) idle cleared lands. It may prove necessary to use other types of land in order to get pasture convenient to the barn, and with an available water supply or to make fencing less expensive. But with due consideration to these important exceptions, the three types of land mentioned will more than provide pasturage for all of the stock kept on the average farm.

How Much Pasture? An acre of good pasture should be provided for each animal unit, (one cow, horse or mule, five hogs, seven sheep or goats or twice as many of each kind of young stock or one hundred hens). Two acres of poor or fair pasture will not take the place of one acre of really first class pasture. Weeds, drought injury and grazing of generally poor quality are found in poor sod.

Soils for Pastures. The grasses and clovers used in pasture mixtures are best adapted to fertile loamy soils of fine texture, having fairly good drainage. While almost any soil will produce some pasture, the more fertile the soil, the better grazing it will provide.

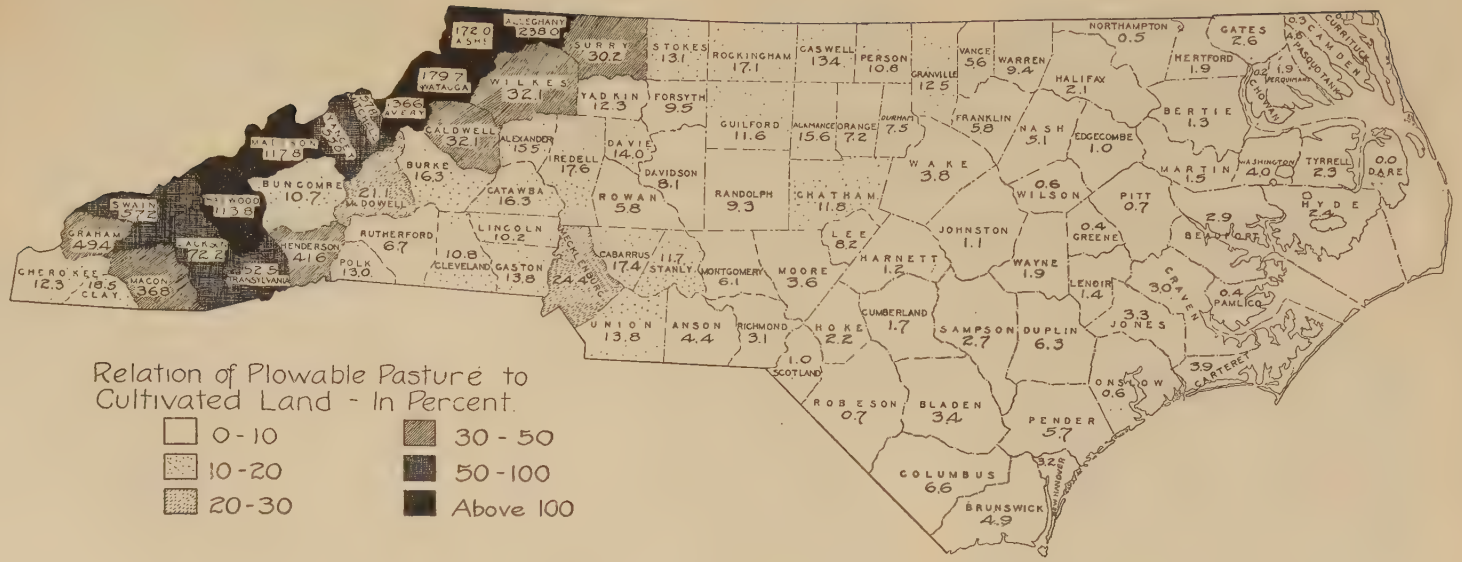
Soil Preparation. Land in a good state of cultivation may be prepared by thoroughly discing or by breaking and discing. All crop residues should be thoroughly incorporated with the soil and the seed-bed be left level.

Cut-over land when practical, should be disced in the preparation of the seed-bed. Land too rough to disc may be burned over and the seed sown as soon as the ashes are cool.

A thoroughly pulverized surface soil with firm compact subsurface is the best preparation for a pasture sod.

Soil Treatment. Pasture responds to good treatment. Lime and phosphates are essential for success with grasses and clovers and are necessary for the animals. An application of one ton of limestone and 300 to 500 pound of fertilizer per acre analyzing 8-3-3 or 12-4-4 gives splendid returns. Applications of barnyard or stable manure applied as a top-dresser during the second or third year after the sod has been established is beneficial and that there is less danger of introducing weed-seed than when it is applied before the sod is formed. Top-dressing with a quick-acting form of nitrogen also usually pays well.

Methods and Dates of Seeding. Grass and clover seed should be thoroughly mixed before sowing. Spring seedings may be made any time after February 20 to April 30. Fall seeding should be done in September or early October, but lespedeza, carpet, Bermuda, and Dallis grasses should always be seeded in the spring. The seeding may be done either with a grain drill or, when the area to be seeded is too rough, by hand and be


ALLEGHANY 23.8
ASHE 17.2
WATAUGA 17.9
AVERY 3.6
WILKES 32.1
SURRY 30.2
STOKES 13.1
ROCKINGHAM 17.1
CASWELL 13.4
PERSON 10.8
VANCE 5.6
WARREN 9.4
NORTHAMPTON 0.5
GATES 2.6
HERTFORD 1.9
CAMDEN
CURRITUCK
PASQUOTANK 1.9
PERQUIMANS 0.2
CHOWAN
YADKIN 12.3
FORSYTH 9.5
GRANVILLE 12.5
HALIFAX 2.1
BERTIE 1.3
CALDWELL 32.1
ALEXANDER 15.1
GUILFORD 11.6
ALAMANCE 15.6
ORANGE 7.2
DURHAM 7.5
FRANKLIN 5.8
NASH 3.1
EDGECOMBE 1.0
MADISON 11.8
YANCEY 3.6
MITCHELL 2.2
DAVIE 14.0
REDELL 17.6
DAVIDSON 8.1
WAKE 3.8
WASHINGTON 4.0
TYRRELL 2.3
DARE 0.0
BURKE 16.3
BUNCOMBE 10.7
CATAWBA 16.3
ROWAN 5.8
RANDOLPH 9.3
CHATHAM 11.8
0.6 WILSON
PITT 0.7
HYDE 2.9
SWAIN 5.7
WOOD 11.3
ASHEVILLE 21
MCDOWELL
GRAHAM 4.9
MACON 3.6
CHEROKEE 12.3
CLAY 18.5
RUTHERFORD 6.7
LINCOLN 10.2
CLEVELAND 10.8
GASTON 13.8
CABARRUS 17.4
STANLY 11.7
MONTGOMERY 6.1
MOORE 3.6
LEE 8.2
JOHNSTON 1.1
0.4 GREENE
BEAUFORT 2.9
HENDERSON 4.6
POLK 13.0
TRANSYLVANIA 5.2
ROCK HILL
ROCKY MOUNT
HARNETT 1.2
WAYNE 1.9
LENOIR 1.4
PAMLICO 0.4
CRAVEN 3.0
UNION 13.8
ANSON 4.4
RICHMOND 3.1
HOKE 2.2
CUMBERLAND 1.7
SAMPSON 2.7
DUPLIN 6.3
3.3 JONES
MARTIN 1.5
1.0 SCOTLAND
ONSLOW 0.6
CARTERET 3.9
ROBESON 0.7
BLADEN 3.4
PENDER 5.7
COLUMBUS 6.6
BRUNSWICK 4.9
WILMINGTON
Relation of Plowable Pasture to Cultivated Land - In Percent.
0 - 10
10 - 20
20 - 30
30 - 50
50 - 100
Above 100

covered with a brush drag. The seed should be put in shallow and be evenly distributed over the land.

Pasture mixtures may be sown alone, with a nurse-crop, or on either fall or spring-grown grain crops.

Improving old Pastures. Frequently old pastures may be greatly improved at low cost. The condition of the pasture will determine what kind of treatment should be given. If the stand is poor, supplemental seeding, in which attention is given to supplying those desirable grasses and clovers that are short in the mixture, should give good results. In addition to reseeding, top-dressing with lime, complete fertilizers and manure as suggested in making new pastures will increase the yields and improve the quality of the pasturage. If this treatment is given during late winter so that the seed and materials used in top-dressing the pasture may be incorporated with soil by the alternate freezing and thawing, there will be little necessity for any cultivation, but at most a light discing or harrowing will be sufficient. Of course there are instances in which it will pay to break, treat and reseed the land outright, but these are rare.

SOIL MANAGEMENT

Of the six and three quarter million acres of land in cultivation in North Carolina, there are thousands which, because of poor drainage, being underlain with hardpan, or the soil being incapable of improvement, will never give profitable returns from cropping. There are others that are unprofitable because they are too steep, or too rocky. No further attempt should be made to cultivate these lands, but they should be turned into pasture or else be reforested. On the other hand, there are nearly a million and a half acres of cleared land now classed as idle, the majority of which could and should be made to yield good returns either as crops or as pastures.

The fundamental need of most North Carolina soils is increased fertility. To attain this end, it is first necessary to terrace rolling lands, so that the soils and their plant food resources will not be diminished by every rain, and to drain flat lands, where needed. There are many of the latter now dependent on open ditches for drainage which could be vastly improved in this respect, and at the same time made practicable for modern machinery by the installation of tile drains.

After providing proper drainage, the next step should be to increase the organic matter and plant food of the soils. Under present cropping systems, the original organic matter contained in most North Carolina soils has gradually been depleted, and very little is being done to replace it. Crop residues ordinarily left on the land, such as from corn, cotton and tobacco, and the stubble of small grain and hay crops are inadequate. The amount of animal manures produced is not, and never will be, great enough to go very far toward this end. Therefore, farmers must make greater use of leguminous soil-improving crops to both increase the content of organic matter, and to draw on the air's inexhaustible supply of nitrogen. To make these crops effective, it will be necessary to plow some of them under, instead of removing everything but the stubble. The best legumes for this purpose are velvet beans, and hairy vetch for very sandy soils: soybeans,

LOCATION OF VARIOUS SOILS IN NORTH CAROLINA

cowpeas, crimson clover, vetch, Austrian winter peas, and lespedeza for sandy loams; and soybeans, vetch, crimson clover, Austrian winter peas, red clover, lespedeza and sweet clover for clay loam and clay soils. Where soils are too acid to grow these crops satisfactorily, lime should be applied. Experimental results show that legume crops when turned under have increased the yields of corn and other crops by from 25 to 50 per cent, even on soils that are heavily fertilized.

A key to soil improvement, high crop yields, and disease control is the use of a well planned crop rotation. Such a rotation will give an income from every cultivated acre every year, either in the form of a money crop or a feed crop, and will at the same time provide legume crops to plow under. When the fertility of the soil has been thus increased, higher yields of crops will be made, and at much less cost per crop unit than is being done at present on most farms.

The fertilizer formulas given in this outline, which are for lands of average fertility, may then be decreased in nitrogen content, and increased in phosphoric acid and potash, making a more effective and a cheaper mixture. It may even become possible on some farms to use only phosphoric acid and potash for most crops and to eliminate the buying of nitrogen altogether.

HORTICULTURAL CROPS
FRUITS

Fruit production naturally falls into two general classes, commercial production and home production. Commercial production may be subdivided into production for shipment to the larger markets, and production for local sale.

Home fruit production is primarily concerned with the growing of a supply of fruit sufficient to meet the needs of the farm family. Any recommendations for expansion in home plantings should be correlated with the nutrition needs of the family rather than being based on monetary values. There is a great need at present for varieties that are resistant to disease in order to minimize the work of caring for the fruit garden.

In both home and commercial production, more complete surveys are needed showing acreage, varieties, and age of plantings.

General Recommendations

A. Soil Management:

1. Maintain and increase soil fertility with leguminous cover crops and judicious use of fertilizers.
2. Prevent erosion by terracing or other means.
3. Practice intercropping to reduce costs of bringing young orchards into bearing.
4. Select and concentrate industry on soils and sites best adapted to fruit growing.
5. Adopt the best soil management methods suitable to the individual site.

B. Pest Control:

1. Regulate number of sprays in accordance with susceptibility of various varieties to insects and diseases.
2. Use improved and efficient spray materials and equipment.
3. Govern time of application by the weather conditions and life histories of the pests to be controlled.
4. Encourage the establishment of laboratories in the commercial producing fruit areas of the State. These laboratories to determine efficiency of spray materials and equipment in relation to insect and disease control, time of application, etc.

   In connection with these laboratories, establish a spray service from which growers may know the exact time to apply sprays.
5. Avoid intercrops or cover crops susceptible to pests attacking fruit plants.
6. Remove abandoned plantings and wild plants harboring fruit pests.
7. Encourage variety certification in addition to the present nursery inspection.

C. **Pruning:**

1. Should be related to other orchard practices such as soil management, fertility, and fertilization.
2. Pruning as well as the other operations should be done with the idea of reducing costs and producing the maximum yield of marketable fruit per tree.
3. Adopt modern pruning methods designed to produce larger, stronger and more productive trees.
4. Adopt a wider planting distance in young orchards in order to accommodate larger trees.

D. **Thinning:**

Thinning is an essential orchard operation and should be performed in order to obtain size, color, quality and grade of fruit.

E. **Variety and Crop Selection:**

1. Plant according to market preferences and in accordance with economical management.
2. Topwork or replace undesirable varieties.
3. Encourage the planting of new varieties adapted to North Carolina and to special market conditions.
4. Develop diversified horticulture where possible in order to increase the economical use of labor and to increase the farm income.

F. **Harvesting and Marketing:**

1. Adopt better methods of handling in picking, grading and packing.
2. Encourage the utilization of standard grades, standard pack and a trade mark in packing and selling.
3. Consider the coöperative movement in relation to purchasing, packing, storage and marketing.
4. Consider recent advances in precooling, refrigeration and transportation methods in relation to distribution.
5. Support the development of good roads.

G. **Storage:**

1. Use properly constructed air-cooled or refrigerated plants.
2. Use correct storage practices.
3. Store only disease-free and standard quality fruit.
4. Consider the storage limitations of varieties.
5. Use careful handling methods prior to storage.
6. Consider stage of maturity in relation to storage.
7. Utlize surpluses by canning or processing where commercially possible.

Specific Recommendations

A. Peach:

1. Commercial plantings should be confined to the most favorable sites.
2. For local market it is inadvisable to increase production beyond trade demands within trucking distance.
3. Commercial plantings in the mountains are not advised because of spring frosts.
4. New plantings and replacements should be governed by:
   a. Market preference of varieties except in home plantings.
   b. The results of the peach tree census now being conducted that will give indications of the potential production.

Properly constructed storage houses for horticultural crops are badly needed

B. Apple:

1. Commercial apple production should be confined to the most favorable sites and locations and grouped if possible, in order:
   a. To facilitate coöperation in production and marketing;
   b. To encourage community packing and storage.
2. It is advisable to increase the volume of dessert apples to meet the needs of local markets and those within trucking distance by top-working undesirable varieties and by making new plantings and replacements.
3. Confine replacements and new plantings to favorable locations near railroad shipping points and state highways.

4. Confine such varieties as Delicious, Bonum, Stayman, Red Winesap and Rome Beauty to Blue Ridge mountains and the foothills. Substitute Red Limbertwig for Rome Beauty in the Brushy mountain area. Encourage the planting of such yellow varieties as Golden Delicious and Grimes Golden in favorable locations as to sites and markets.
5. Encourage the production of early varieties for local and distant markets in locations that are favorable from the standpoint of soil, site and marketing.

C. **Sour Cherries:**

1. Encourage future plantings in Western North Carolina where favorable markets, canneries and sites warrant.

D. **Nuts:**

1. Commercial pecan plantings should be discouraged except in favorable locations in the eastern part of the State.
2. Home plantings should be encouraged in the lower Piedmont and eastern areas to supply home needs and local markets.
3. Plantings of the new varieties of black walnut such as Stabler and Thomas should be encouraged in favorable locations.

SMALL FRUITS

1. **Strawberry:**
   a. Individual commercial plantings in many instances are overexpanded and should be reduced in order to increase economical production and to encourage the adoption of better harvesting, grading and marketing methods.
   b. Future expansion of commercial acreage should depend on production in other states and competition in terminal markets.
   c. Consideration should be given to the Blakemore variety (U.S.D.A. Seedling 659) in replanting because this berry is apparently superior to present standard varieties.
   d. It is inadvisable to increase production for local markets beyond the demands of such markets.
   e. Varieties for local market should be selected with a consideration for succession in harvesting.

2. **Dewberry:**
   a. Many of the problems affecting dewberry growing are similar to those affecting the strawberry industry.
   b. The Young variety is recommended for trial in the present commercial areas as a substitute for Lucretia and as a succession crop in the commercial strawberry area.
   c. In other sections the Young is recommended as a local market berry to precede the blackberry.

3. **Raspberry:**
   a. Commercial raspberry production is limited to Western North Carolina.

b. Plantings are recommended in the present fruit and vegetable sections in Western North Carolina.

c. Introduce the disease free Latham variety as a commercial berry and for the production and sale of disease free plants.

4. **Grapes:**

a. Encourage future plantings of bunch and muscadine grapes to meet local demand.

b. Confine bunch grape plantings to areas where growing conditions are most favorable.

c. Confine muscadine plantings to central and eastern sections.

5. **Miscellaneous Small Fruits:**

a. Encourage the planting of figs in sheltered locations, especially for home use and local markets.

b. Encourage growers with sufficient capital and good sites to make trial plantings of improved blueberry varieties.

VEGETABLES

Vegetable production in North Carolina naturally falls into three general classes, namely, Commercial Production (carlot shipments), Market Gardening, and Home Gardens.

Commercial Truck Growing is subject to unusually severe competition, weather hazards, and fluctuations in acreage and production. Costs of production are high for all crops on the average. The products are usually highly perishable and the season of a given crop is of short duration. Storage or other means of holding surpluses is not possible in most cases, so success depends to a great extent on marketing. Outstanding needs are better handling, grading, packing and distribution.

With most crops grown for shipment, very little expansion of acreage seems advisable at the present time. A few crops, such as onions, asparagus, rutabagas and Italian sprouting broccoli are worthy of further expansion.

Crops adapted to both canning and shipping will stand a gradual increase in acreage as the canning and pickling industry develops.

Market Gardening includes all truck growers selling on home markets, and the following guides are suggested.

1. Supply local markets within driving distances of production.
2. Produce a wide variety of crops.
3. Lengthen period of production of important crops by succession planting.
4. Grow and market only quality produce. The appeal of locally grown vegetables centers largely around quality and freshness.
5. Encourage the use of special methods such as the use of irrigation and of cold frames in order to supply popular crops during periods of shortage and high prices.
6. Raise the grades and standards of the produce sold.

Home Gardens. Every farm family in North Carolina should have a good garden. The home garden program should be closely correlated with the nutrition program in order to emphasize the importance of vegetables in the diet.

A minium of one-tenth acre per person, or one-half acre for a family of five, should be set aside for garden purposes. Data secured in North Carolina show that the vegetables which can be grown in a half-acre garden would cost at least $225 if bought at chain store or curb market prices.

A wider variety of crops should be encouraged, and canning, preserving, pickling, and storage of surpluses should be more widely practiced.

The present acreage to commercial truck crops needs little expansion

General Recommendations

A. Seed and Variety Improvement:

1. Grow the varieties best adapted to the soil and climate of a region and best suited to the uses for which it is to be grown.
2. Standardize varieties and strains in communities or regions in order to improve quality, uniformity, yield and marketing for use as a fresh or canned product.
3. Encourage growers to produce seed stock that will meet the requirements of the State Crop Improvement Association. Irish potatoes in the mountains and sweet potatoes in other areas offer opportunities in this work.
4. Promote a wider use of certified seed among growers.

B. Soil Management:

1. Encourage soil improvement through
   a. The use of leguminous green manure crops.
   b. Drainage, irrigation, terracing, and other means of soil improvement.
   c. Judicious use of fertilizers in reference to time of application, proportion, kind and amount of materials.
   d. Adopt a suitable and constant rotation not only for soil improvement but also for pest control.
2. Encourage the use of crops especially adapted to the soil type, reaction and fertility.
3. Encourage the utilization of soils and sites best adapted to various vegetable crops.

C. Cultural Practices:

1. Continue experimental and demonstrational work at time of planting, rate of seeding, methods of cultivation, spacing, etc.
2. Adopt improved plant-growing methods, and use vigorous plants in transplanting to the field such crops as cabbage, tomatoes, lettuce, etc.
   a. Consider possibilities of plant protectors, paper mulch, etc.
   b. Encourage the use of home-grown plants with transplanted crops. In many cases plants may be grown coöperatively or by a community plant grower.
3. Use efficient and labor-saving machinery.

D. Pest Control:

1. Study life histories of pests in relation to practical control measures.
2. Use better spraying and dusting equipment.
3. Urge the importance of timeliness and thoroughness in the application of control measures.
4. Introduce resistant varieties in sections where disease is serious. Wilt-resistant varieties of both cabbage and tomatoes should be more generally used.
5. Practice rotation and field sanitation as a practical measure of control.
6. Practice seed and soil disinfection.

E. Harvesting and Marketing:

1. Harvest when crops have attained their highest market quality.
2. Handle products carefully from time of harvest to loading on cars.
3. Pack carefully and sell on a basis of grade.
4. Study present methods of distribution with a view to their improvement. For most crops, the market could be expanded if better distribution could be brought about. A consumption survey of cities of North Carolina is needed as an aid to distribution.
5. Encourage more effective roadside marketing and a better use of present curb markets.

F. Canning and Pickling:

1. Coöperate with canneries, and other processing plants in securing a sufficient supply of vegetables for economical operation.
2. Consider possibilities for expansion of canning and pickling industries. Further expansion of the canning and pickling industries would justify increased plantings of such crops as cabbage (for kraut), beans, cucumbers, tomatoes, peppers, spinach, onions, cauliflower, and asparagus.
3. Educate growers and prospective cannery operators to the need of a supply of vegetables over a rather long season if operations are to be placed on an economical basis.
4. Encourage coöperative plant-growing with canning crops that must be transplanted.

G. Storage:

1. Encourage better storage methods in western North Carolina for Irish potatoes and cabbage.
2. Urge expansion of curing and storage houses for sweet potatoes. Recommend storage by the individual farmer rather than on a cooperative house basis.
3. Encourage more efficient storage house management, including such factors as temperature regulation, disinfection, etc.

FLORICULTURE

Floriculture is primarily commercial in nature, and the chief field of service is that which applies to commercial floral crops. There is a great need for a survey of the industry in order to determine its growth and extent; its relative importance in various general locations; movement of products into and out of the State; and studies in the economics of production in North Carolina as compared with costs in northern states which have in the past dominated the industry.

A. Greenhouse Culture:

1. Study problems of location, sites, climate, kind and size of house, orientation, arrangement, construction materials and methods, heating systems, etc.
2. Investigate the problems of markets, transportation, and the character of production that is likely to prove most profitable.
3. Make a study of floral crops on a basis of varieties and crops best suited to North Carolina conditions.
4. Investigate problems of soils and fertilizers, house management, and pest control.

B. Field Crops:

1. Survey the bulb industry of the State, studying such factors as soil management, the use of fertilizers, culture, pest control, and storage practices.

2. Investigate the possibilities of floral crops which may be grown in the open or with only slight protection.
3. Review the problems of marketing and transportation.

C. Home Floriculture:

1. Furnish information on house plants, their propagation, culture and care.
2. Encourage amateur culture of cut flowers.

LANDSCAPE ARCHITECTURE

North Carolina is rich in the variety and beauty of her terrain, her climate, and her flora. With these tremendous natural advantages and beauties at hand the great problem in Landscape Architecture is that of their portrayal in terms of the human element through the setting up of models or examples of good planning, good planting, and good care.

Such demonstrations created for study and observation as to choice of sites, adaptations of the designs to the topography, selection of plants, planting designs, and systems of maintenance, supplemented by lectures, consultation and advice should stimulate the improvement of both public and private grounds throughout the State. The results of such a movement should be measurable by both social and economic standards.

The program in this movement for better grounds and gardens consists in:

1. The mapping of the State along county lines most closely approaching the boundaries of distinct floral regions into districts; the study and determination of the best ornamental plants in the flora of each; observation on non-native plants in each, to determine their adaptability to soil and climate; and the publication of lists of such dependable plant materials with necessary cultural data for use in each district and throughout the State.

2. Selection of sites and design of plans for district demonstration grounds (i.e., of a courthouse, a school, a church and church yard, and a farmstead and section of public highway in each) to be made by the Landscape Architect in charge provided (a) that funds for a complete survey, a proper execution of the plans, and for perpetual care can be insured; and, provided further, (b) that supervision as to care and any alterations of the model grounds thus chosen, designed and planted, shall throughout the duration of the demonstration be vested in the Landscape Architect in charge of this work.

3. Demonstrations are to serve as models of the best type of design and to bring to the people of North Carolina authentic standards and to provoke in them a realization of the natural beauties and possibilities for improvement of their own properties.

FORESTRY

For more than a quarter of a century the magnificent pines of the South have been America's mainstay in timber production. In spite of the favorable climate, fertile soil and tree species of amazingly rapid growth we have so far over-balanced timber growth that the exhaustion of the virgin timber of the South is already in sight. Stacks of lumber in local lumber yards shipped in from the Pacific Northwest attest that the nation is turning to the West for its lumber supply. Western lumber will be a factor in supplying high grade materials to the eastern markets only during the period while the virgin stands supply the cut. This period is estimated at about 25 years. This is the period in which North Carolina has an opportunity to build up its forests.

The South has taken the leadership in some of the most significant steps this nation has ever made. The South is in a favorable position today to assume leadership in forestry and thus insure the perpetuation of that most useful of all nature's gifts, wood. It is not so much a task as an opportunity, but in all this the important thing is time. Each year's delay means another year of forest fires and forest destruction and another year's postponement of the harvest. Hesitation and delay will not reclothe our forest soils with trees and bring back the leadership in forest production.

These problems are especially important and applicable to the State of North Carolina. The State has a total land area of 31,193,600 acres. Of this total area not quite 7,000,000 acres are in land crops. About 21,000,000 acres are classified as forest producing land. The forest producing acres are divided into approximately 11,000,000 acres of farm wood lands, that is, areas connected with the farm owned land and about 10,000,000 acres of forest tracts. Seventy per cent of the entire land area is forest land.

It is estimated that at the present time forest growth in North Carolina will average about 250 board feet per acre per year. This would mean that under the present conditions we are growing approximately 5,000,000,000 board feet of timber in the State every year. The present lumber cut is over one billion board feet per year. A greater amount is used for fuel and other purposes. From these general figures it is evident that timber is growing at about the same rate that it is being cut in North Carolina at the present time. This would indicate that the problem is not a very serious one for the State, but unless the type of timber is produced that will fulfill the requirements of the lumber industry and the wood-using plants of the State the industries must soon move on, as they have done in other sections of the United States. With proper handling of the timber lands, not only the quantity of material needed but also the quality, can be grown. The production can be increased to about 400 feet per acre per year in a period of ten or fifteen years and can be raised to 500 feet per acre per year within a period of about 50 years if proper methods of handling forest lands are put into practice. The wood using industries that are now operating in the State of North Carolina, it is estimated, have a value of about $200,000,000 annually. In order to maintain these industries the

materials required for their needs must be produced within reach of their plants. If they must go far afield to obtain their supplies the next move will be to shift the plants near the source of the supplies. The question then that confronts the State today is whether these industries will be maintained within the State and enlarged or whether they will be left to follow the source of material further away and take with them the great payrolls that are the basis for development in any community.

With the average production at 400 board feet per acre per year there would be an annual growth of 8,400,000,000 board feet on the 21,000,000 acres of forest land in the State. With the annual per capita consumption for the United States at 316 board feet would mean a lumber consumption of about 1,000,000,000 board feet for the 3,000,000 people of North Carolina. Taking only 50 per cent of the total production as lumber leaves 4,000,000,000 board feet annually for export as lumber, or to be utilized by the industries, and still supply 4,400,000,000 board feet of material for all other uses.

The State of North Carolina is fortunate in having so much timber left within its borders at the present time. Although it is rather late to begin a constructive program for forestry development it is not yet too late. There is still enough timber to pay a revenue during the period that a constructive program is being put into effect. In other words, it has not reached the stage where it is necessary for the productive agricultural land to pay the bill for restoring forest land to productivity.

A PROGRAM FOR FORESTRY

There are many things to consider in putting a forestry program into effect. One of the basic things in dealing with any land problem is land valuation. The records of the agricultural section of North Carolina show that at the present time there are large areas being cultivated at no profit or even at a loss. When such results are tabulated it shows a low yield for the entire agricultural section of the State. This is due largely to the fact that the land that will produce at a profit must be averaged with the land that is unprofitable, consequently the entire area does not show its true value. The remedy for some of this would be to abandon some of the non-productive cleared land in the State at the present time and farm the other sections of the agricultural area more intensively and at a profit. This problem has attracted a great deal of attention throughout the United States in attempting to classify land as to its value for growing agricultural or forest crops. A great deal of land that is unprofitable for agriculture is very good forest producing soil. There is a movement in Northern Minnesota to take the farmers who are attempting to make a living on unprofitable agricultural land and move them to better agricultural land and reforest the area that has been in cultivation. This is a social problem as well as a forest producing or agricultural economic problem. The scattered farmers back in the forest areas have no opportunity for schools, it is a difficult problem to develop roads, there is no income in the way of taxable wealth for such development, with the result that they are either left on their own resources or the better sections of the county or state are taxed to carry on an unprofitable undertaking.

This same problem is very important within the State of North Carolina. The farming of land on steep slopes or on poor soil, or both, brings about just such conditions as have been mentioned, while in addition these scattered farms are a continuous menace to the forest land surrounding them. Our greatest problem at the present time is the control and prevention of forest fires. A man located within the forest area must do some land clearing. He wants to burn some areas for pastures, or fires may be set through carelessness. It is estimated that around 95 per cent of our forest fires within the State are man-caused fires. It is evident that the forest fire situation is a human problem. The only way to meet it successfully is by getting the coöperation and support of at least a large majority of the people. This can only be done by making it to their own advantage by either showing them that prevention of forest fires would produce a better timber crop, or that nothing is gained in the way of improving pastures by burning or that whatever purpose they have in burning the woods it is unprofitable to them.

FORESTRY EDUCATION

Forestry education has been gradually gaining ground in the higher institutions of learning in the United States. There are now well equipped forest schools in many sections covering the different types of forest conditions. The area most in need of a complete forest school is in the Southeastern area of the United States. This area is perhaps more backward than any other section in forestry needs, due largely to the lack of forestry education not only in the higher institutions but throughout all of the schools. The forestry program will progress in just the same proportion that the people of the State get behind it.

It has been wrongly stated that fire protection is about 90 per cent of forestry. Those engaged in forestry work realize that fire protection is an absolute necessity before any forestry work can be undertaken, but the field of forestry is much broader than is realized even by foresters themselves. The national forest education committee lists the following occupations that are looking to trained foresters to carry on their programs. They include: General administrative work in forestry; management of public forests; management of public parks and wild life reservations; management of privately owned forests; consulting work in forestry; appraisal, purchase and sale of forest lands; range management; management of forest nurseries; organized forest protection; construction of improvements and various other aspects of engineering; logging, manufacture, and merchandising of forest products; purchase of forest products; wood seasoning; wood preservation, arboriculture; forest recreation; advancement of the forestry movement through public agencies or voluntary associations; industrial association activities; extension work in forestry; forest education; and research in different branches of forestry.

For carrying on these many lines of work it is necessary for a trained forester to have a broad viewpoint of the entire field.

There is no doubt but that forestry will progress rapidly in the State of North Carolina and in the South in the next few years. The coöperation of the practical and educational fields will further this cause more than any other one thing that could be done. By getting trained foresters in the

business management of the manufacturing and merchandising of forest products as well as the growing of trees and wild life all agencies will soon be interested in the progress of the entire program. This is the basis for a complete successful fire protection program, for getting the proper method of silviculture practiced, and will give the impetus and support for additional research to find new facts to carry on the industry in the future.

To further this program a Department of Forestry has been established at State College equipped with educational facilities. However, a forest school would be in no better position for teaching forestry without a demonstration forest than a medical school without a clinic or hospital.

In order to carry out a well rounded program it will be necessary to have demonstration forest areas in the Coastal Plain, on the Piedmont Plateau and in the Mountain section of the State. The forest conditions of North Carolina cover, perhaps, a broader range of conditions than any other state in the Union. For this reason the conditions worked out for one locality will not be applicable in the other parts of the State. These demonstration forests should be units of about 25,000 acres each in order to make them a practical administrative unit. Within a short period, depending on the condition of the land when acquired, these demonstration forest areas would be producing a definite revenue to the State and it would not be a very long period until areas such as mentioned would be producing all the revenue needed to carry on educational forest work in the State. These tracts would provide facilities for carrying on research and demonstration by intensive methods and would produce results usable on the large tracts of state lands to be acquired in accordance with the proposed North Carolina Forestry Association Bill. Methods for management of small timber tracts and farm woodlands would be demonstrated. Cooperation between these demonstration forests and the State forests would carry the message of scientific land applied forestry to all timber owners.

TAXATION

In order to make the growing of timber a business proposition in the State of North Carolina a workable method of taxation of timber lands is needed. A law on forest taxation passed by the Oregon Legislature in March, 1929, is one of the outstanding pieces of legislation in the United States today that is getting at the basis of solving our forest producing problems. Briefly, it provides that every forestry board of the State is authorized to classify the lands within the State. After the land has been classified as forest producing land the owner may accept the classification of the board and have his land listed as forest producing land or he has the right to retain his land as classified under the other land classifications. If he accepts the forest classification then he pays five cents per acre per year without regard to land valuation of productive capacity of the land. When he harvests the crop from the land so classified he pays 12½ per cent gross yield tax. This law is one of the most practical and workable pieces of legislation that has ever been applied to forest lands in the United States. The taxes collected are paid into the central office of the taxing district and then reapportioned according to the tax values of the lands so classified in the various communities.

The proposed constitutional amendment provides for the classification of lands and paves the way for tax legislation along similar lines as those stated above.

REFORESTATION

The large number of forest tree species in the State of North Carolina add a great deal to the value of the forest products. Where the species occur in mixture it is sometimes difficult to reproduce the particular kind of tree that may be desired at that time. However, the number of species is one of the best safeguards for the assurance of a future supply of timber. If any disease or insect attack should occur it is always confined to one or at least only a few species in any locality. A striking example is the killing of all the chestnut by the chestnut blight. When a calamity of this kind occurs in a region made up of only one or two forest species it means almost total destruction. The same thing not only is much less harmful in a region of mixed species but it also is not so apt to occur or the mixture of species is a complete safeguard. This is definitely shown by a condition such as the white pine in New England. The white pine is severely attacked by the white pine weevil when in pure stands. In mixture with other species the white pine is attacked to some extent but is very much more protected.

Every farm has a market for a great quantity of forest products

One very valuable feature of the North Carolina trees is their abilty to reseed in an area from which the timber has been removed. When natural conditions are not too much changed and some seed trees remain on a cut-

ting area the only requirement to fully restock the land is complete protection from fire. The climatic and soil conditions are also a factor in the natural regeneration of the forest. The ease of securing natural regeneration and the rapidity of growth are two of the principal factors that make the forest-growing business profitable in North Carolina. There are very large lumber companies that are undertaking the replanting of cut-over lands in some sections of the United States.

Planting necessitates a cash outlay at the beginning of the crop which can only be harvested at some future time. Although there is considerable acreage in the State that will need to be planted in order to bring it back to forest production there need be no planting on areas that are properly handled during the lumbering stage. This means that the lands that are now non-productive can be re-stocked through planting and then kept stocked by proper management of the forest during the next logging period.

The planting of forest trees is being rapidly advanced by the Department of Conservation through the nursery stock supplies from the State nursery.

FARM WOODLANDS

The growing, harvesting and marketing of farm timber is one of the really big problems confronting many North Carolina farmers today. Upon the degree of success which they attain in solving this problem depends the future economic welfare of the farm, whether it be owned or rented. Approximately 50 per cent of the forest lands of North Carolina is found on the farms. This acreage in turn makes up about 50 per cent of the total farm area. The total acreage of forest or potential forest lands might be greatly increased by adding the million-and-a-half acres of farm land that has been cleared for crops, but now abandoned or otherwise idle. This portion of our farm land has in the past furnished a large percentage of the income to many farmers. It has been the chief source of "FARM RELIEF" to 90 per cent of our farmers during past periods of depression. In the future it will prove to be either a "gold mine" to the farm owner or a "millstone" about his neck. The success or failure will depend upon the efficiency of methods used in growing, harvesting and marketing the timber crop.

The management of farm forest lands is largely a question of taking a harvest by the methods which will give profitable returns now, and promote efficient production of the highest quality timber for future crops. Profitable timber production requires:

(a) Absolute protection from fire.
(b) A system of management which will give a full stand of rapid growing trees of the most valuable species and provide for the utilization of the full crop.
(c) A method of harvest which will insure a quick reseeding of the area.

Such a system of management calls for the making of improvement, cutting to take out all crippled, diseased, mature and over-crowded trees, and the making of periodic harvests or thinnings.

The type of harvest depends upon the market available for the material harvested. Generally speaking, about 80 per cent of the cost of lumber as it goes to market must be charged to labor. On the average North Carolina farm not more than half of the time of the farmer and his laborers is used. Recent yearly records kept on 80 average farms in the State show the average farmer and farm laborer working approximately 155 days out of each year. This brings us to the question: *Is it not possible for the farmer to sell more of his labor through the cutting and marketing the timber crop he is producing?* Thus, in the marketing of farm timber we may consider more than the sale of stumpage. In many cases it will prove more profitable to make a combination sale of both stumpage and labor.

Market on the Farm for Forest Products. Every farm has its own market for a great quantity of forest products for fire-wood, fencing, construction and repair of farm buildings. The market offers one of the chief advantages of the farm timber producer over the commercial operator. The low-grade materials can be used for fuel, etc., leaving only the higher class material to go into commercial fields.

The farms of the State require not less than 4,250,000 cords of fuel for heating the homes, cooking the meals, curing tobacco, etc. An additional three-quarter million cords are sold in towns and cities. Thus making a total of more than 5,000,000 cords of fuel wood. Using several hundred demonstration areas as a basis for this statement, we find that an average of eight cords of wood per acre can be removed from each acre of farm woodland by thinnings and improvement cuttings. With this home market for low-grade material it can be seen that if every farmer would take the proper advantage of this market, the North Carolina farmers could put *more than six hundred thousand acres of woodland under management each year.* Add to this the material marketed in crossties, pulpwood, logs, lumber, etc. With a thoughtful and commonsense State-wide system of cutting and marketing of farm timber it would be practical and possible to put the entire *acreage of farm woodland under management within ten years.*

TIMBER MARKETS

The greatest handicap to the timber grower at present is a market that will take his produce at any time. This affects the small timber owner more seriously than the large owner or producer.

Where it is not possible to establish wood-using industries, permanent lumber mills, dimension mills, etc., the next best step is the establishment of log markets or timber markets where the farmers can sell their produce. Why not have log merchants just as we have produce merchants, cotton merchants, etc.

The cedar market at Greensboro, the dogwood markets at High Point and Statesville, or the pine pulpwood market at Roanoke Rapids, are good examples of timber markets and show the mutual advantages to the producer and the manufacturer. These markets are always open. Farmers need not have a contract. They can cut a load of material and go to market. This makes the timber a cash crop the same as other farm crops.

LIVESTOCK

Agencies interested in the betterment of Agriculture in the State have long advocated more and better livestock on our farms. The different livestock enterprises are discussed separately in the sections that follow and the more important phases of each are emphasized. The discussion throughout, is based upon the state-wide point of view and more details and refinements will naturally be desirable in the area, County or Community programs.

THE DAIRY INDUSTRY

Dairy farming is a comparatively new industry in North Carolina. The first creamery of which we have a record was built in the fall of 1909, and until that date no commercial dairying had been conducted in the State, with the exception of fluid milk for towns and cities, and a small amount of farm butter. Since then the growth of the industry has been gradual, but permanent.

The average of milk production by North Carolina cows may be raised by the use of pure bred sires

During 1928, there were 18 milk distribution plants, 18 butter factories, 29 ice cream plants, and five cheese factories in operation. These plants paid approximately $3,000,000 to 12,600 North Carolina farmers for raw products. In addition, there were 1,000 retail dairymen who distributed approximately $10,000,000 worth of milk to the urban trade. No records are available on the production of the retail herds in 1909.

Added to the development in dairy manufacturing plants, during the past 18 years, there has been a marked improvement in the quality of herds and the methods used in caring for them. This improvement is reflected in the average, annual milk production of the North Carolina dairy cow which has increased from 2,666 pounds in 1920 to 3,600 pounds in 1928. Creamery butter production has increased from approximately 10,000 pounds in 1909 to 2,250,000 pounds in 1928. In 1909, there was only one small milk distributing plant in the State on which no records are available, concerning the amount of milk handled annually. In 1928, the 18 plants operating in the State distributed approximately 5,475,000 gallons of milk. The first cheese factory was erected in 1914. In 1928, there were five and they produced 160,500 pounds of cheese.

Although marked development has taken place in the dairy industry of the State during the past 18 years, there is still much room for improvement and expansion.

Crop production has been the main business of North Carolina farmers since the Civil war. In the Eastern half of the State this type of farming still prevails, and here are many farms without a family cow. Due to this condition the rural per capita consumption of milk and butter in this part of the State is far below what it should be. The per capita consumption of dairy products for the entire State is below that of the nation In spite of low consumption it is necessary to import large quantities of dairy products annually to meet the demand of the local market.

The average yearly milk production of the North Carolina dairy cow is only 3,600 pounds while that for the cows in the North Carolina Herd Improvement Association is 6,673 pounds.

This low production can be attributed largely to a shortage of good dairy feeds, such as legume hays and pastures, also to the use of grade sires. It is estimated that about 70 per cent of the dairy sires in use at present in this State are grade animals.

RECOMMENDATIONS FOR DEVELOPMENT

The Dairy Committee makes the following recommendations for the further development of the dairy industry:

1. Produce an adequate amount of dairy products for home consumption and local markets.
2. Raise the average milk production of the North Carolina Dairy cow.
3. Encourage official testing.
4. Produce quality dairy products.
5. Establish creameries and cheese factories where needed.
6. Encourage a more general use of good dairy farm equipment.
7. Make dairying a permanent part of the farm business.

1—Adequate Production Necessary

The production of at least one cow is needed for each farm family. Milk is not only an economical food, but doctors, nurses and food specialists agree

that it is necessary in the child's diet for proper development. There are so few cows in some of the Eastern North Carolina counties that it seems evident that before much dairy development takes place there, a greater desire for dairy products must be created. This can, the committee believes, best be done through persistent teaching concerning the value and necessity of milk in the human diet and especially in the diet of young children. This work can be done through schools, civic organizations, and all other developing agencies that may be available.

Creameries and cheese factories should be established where needed

Commercial dairying for the purpose of producing milk and cream for the secondary markets in North Carolina should be increased for the following reasons. By secondary markets is meant those provided through creameries, cheese factories, etc.

(a) North Carolina has a good local market for butter, cheese and condensed milk, and is also located within a twenty-four hour run of the large dairy markets of the East.

(b) The soils of this State will grow successfully the essential feeds necessary for the economical milk production.

(c) The dairy cow will provide a monthly cash income which is much needed on most North Carolina farms.

(d) There are many idle acres on the farms of North Carolina which could be made to return an income if converted into pasture and grazed by good dairy cows.

(e) The cost of collecting cream from the average cream producing herd in this State, which consists of about two cows, is excessive. In order for these herds to be operated on an economical basis they should be

enlarged to an average of at least five cows to the herd. An increase in these herds should be preceded by a corresponding increase in feed production.

2—Increased Average Production

The average milk production of the cows in this State 3,600 pounds, is too low to be profitable. In order to raise this the following recommendations are considered fundamental.

(a) Feed liberally of a balanced ration which can be made up largely of home grown feeds. On dairy farms, one and one-half tons of legume hay and three to four tons of silage should be provided every year for each cow in the herd. In addition to this, other roughage such as grass hays and corn stover can be fed, but these low milk producing feeds should not be made the basis of the dairy cow's roughage ration. On most farms where silage is not available the quantity of legume hay should be increased to two tons.

Sufficient grazing should be provided in the form of permanent pasture and cover crops to furnish full grazing for as many months of the year as weather conditions will permit. One acre of good pasture will be needed for each mature cow.

In addition to the above roughage and pasture 1,800 to 2,000 pounds of grain will be required for the feeding of an average good cow through a period of one year. High producers will require more grain.

(b) Use good purebred dairy sires, preferably out of cows of known production. At least 70 per cent of the dairy sires now in use in North Carolina are grades and scrubs. Before much improvement can be made in the milk production, these low grade bulls must be replaced by good purebreds. Heifers out of native cows, sired by bulls of proven ancestry will produce from 800 to 1,200 pounds of milk more each year than their dams. Therefore, the committee strongly recommends the use of only good dairy sires and the proper raising of the heifer calves as a means of increasing the average milk production and also the number of cows in the State.

(c) Keep herd records. In order to secure the most economical milk production it is necessary to keep feed and production records on each cow in a dairy herd. This can be best done through an organized Herd Improvement Association where 20 or more herds, which will average 18 cows can be found in a radius of 30 miles. The information secured through these records will make it possible to feed grain according to milk production; to locate unprofitable cows; to select heifers for replenishing the herd from the highest producing cows, and to determine the ability of the herd sire to transmit high production to his offspring.

3—Encourage Official Testing

In North Carolina there is a need for approximately 2,500 good dairy sires annually. In order to secure sires of proven ancestry an increase in the number of cows now on official test is recommended.

4—Produce Quality Dairy Products

Quality in dairy products is of utmost importance. Farmers should learn that the production of quality dairy products begins on the farm and that if a low grade milk or cream is produced the price which is received for it will be correspondingly low.

Creamery managers should work in close coöperation with the producers and advise with them from time to time concerning the quality of the raw products. Instructions concerning the proper methods for handling milk and cream on the farm can be secured from the dairy department of the North Carolina State College.

5—Establish Creameries and Cheese Factories Where Needed

In an undeveloped section the erection of a creamery is recommended when an established market for milk or cream cannot be reached at a reasonable cost and when the cream production from at least 600 cows can be secured.

The establishment of a cheese factory is recommended for localities where a fluid milk market is not available and when the milk from at least 200 cows can be secured in a radius of five miles.

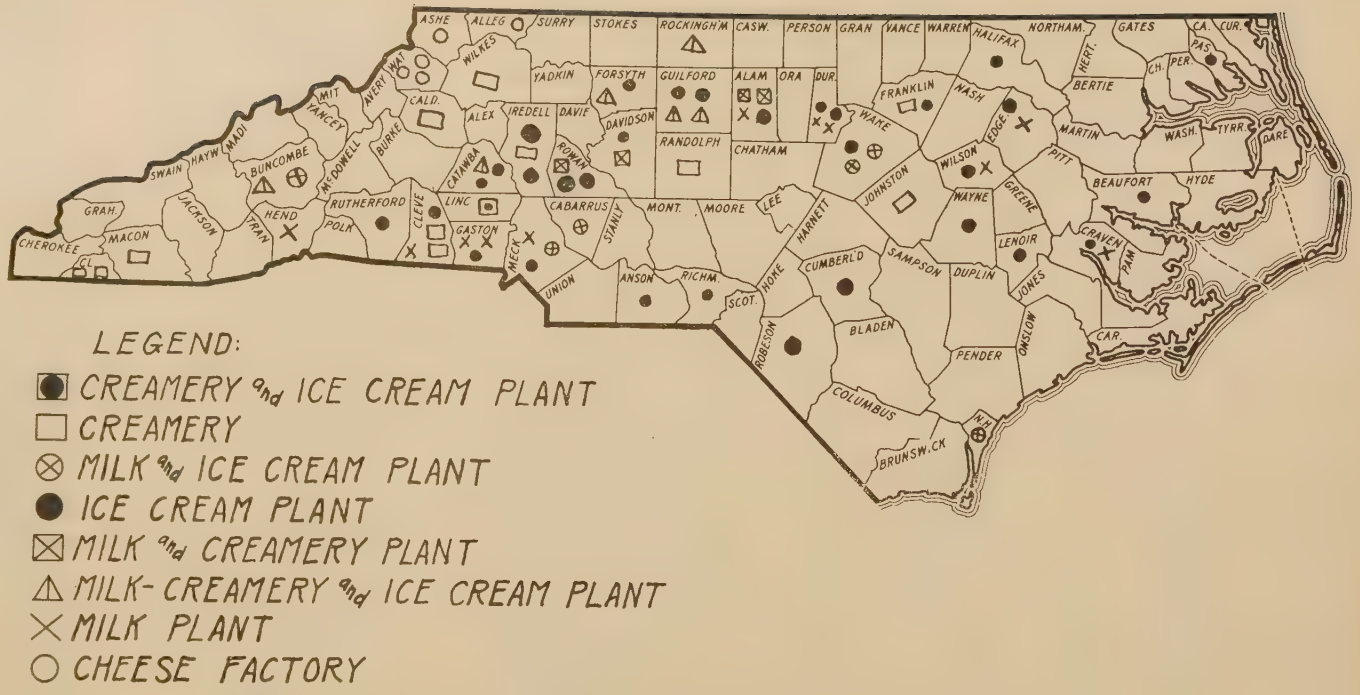
In view of the fact that several of the creameries and cheese factories now operating in the state are receiving an insufficient quantity of raw products to make possible the most efficient plant operation, the committee recommends that these plants be patronized as far as practical rather than new plants being erected. Practically every farmer in the State that is in reach of an express office is now within shipping distance of a milk or cream market. Community leaders interested in the establishment of a local creamery or cheese factory may advantageously communicate with the Dairy Department of North Carolina State College, which will give them information concerning the requirements of such a plant.

6—Good Dairy Farm Equipment

In order to get the most economical returns from dairy cows they must be provided with comfortable, well lighted stalls that can be easily cleaned and free from drafts. Each cow should have four square feet of window space and 500 cubic feet of air space. Since silage is one of the most economical feeds for dairy cows, each herd of 12 to 15 mature cows should be provided with a silo. Equipment for cooling and handling milk and cream in a sanitary way is also essential for the production of quality dairy products. Plans for dairy barns, silos, milk houses and milk cooling tanks can be secured from State College.

7—Make Dairying Permanent

The growing of cotton and tobacco will continue to be the main business of a large number of North Carolina farmers. Farm dairying is recommended as a supplement to these money crops and not as a substitute for either, nor as an emergency measure for low priced cotton or tobacco.



LEGEND:

- ◙ CREAMERY and ICE CREAM PLANT
- □ CREAMERY
- ⊗ MILK and ICE CREAM PLANT
- ● ICE CREAM PLANT
- ⊠ MILK and CREAMERY PLANT
- △ MILK-CREAMERY and ICE CREAM PLANT
- × MILK PLANT
- ○ CHEESE FACTORY

The farmer who goes into the dairy business one year and out the next according as the cotton or tobacco market is up or down, will be a failure as a dairyman. However, the farmer who keeps only a sufficient number of cows to consume the by-products of a well regulated cropping system and, year by year, gradually builds up the production of these cows by good breeding and proper feeding will find that they will give him a profitable monthly cash income without any material increase in farm labor cost or interference with his regular farming operations.

PORK PRODUCTION

The most profitable known method of feeding and marketing hogs has been systematized in a form which is easy to understand and readily adaptable to the usual conditions on the farms of the State.

For a farmer with fairly fertile land to succeed in properly feeding and efficiently marketing hogs, it is necessary that he should do the following five things:

(1) Adjust the number of brood sows to the amount of home raised corn available for them, allowing 150 bushels of corn per sow per year.
(2) Use good, thrifty animals and keep them so by giving due attention to proper housing, sanitation, and parasites.
(3) So control breeding dates as to profit by the average seasonal trend of hog prices.
(4) Full feed, either by hand or through a self-feeder on pasture when possible, all the hogs intended for market will eat every day from the age of four weeks until they are sold.
(5) Stick to the system outlined above regardless of changes in the price of corn or hogs.

All that is necessary for success in commercial pork production on a fertile farm is shown in the system briefly outlined above. The feed should consist of corn properly supplemented according to the weight of the animals. (Corn will constitute about 80 per cent of the total feed to produce a 225 pound hog.) If operations conform to the five points mentioned, the degree of success will be governed by the fertility of the land and the ability of the owner as an animal husbandman.

RECOMMENDATIONS

Breeding. The use of purebred animals of modern type is recommended with especial emphasis placed upon the use of purebred males.

Sows from which the expected produce is intended for market, should be bred as nearly as possible May 1, and November 1, in order that their pigs may be full-fed for maximum gain and sold in accordance with the price chart on page 84.

Housing, Sanitation and Parasite Control. Beds that are damp or dusty are bad. Houses with floors, guard rails or fenders should be provided, and the walls should be sufficiently tight to protect young pigs from drafts of cold air and keep them comfortable in winter weather. Bedding should consist of short material of an absorbent nature.

Blue prints of such houses of both colony and central type may be obtained from the Agricultural Engineering Department, State College.

Sanitation. This means nothing in the world but cleanliness—it should be practiced in connection with houses, troughs, self-feeders and lots. Disinfectant should be used liberally.

Lice Control. The use of spent cylinder oil without the addition of kerosene is recommended.

Worm Control. Santonin given according to directions is recommended for the reason that the animals will take it voluntarily. When forcible dosing is resorted to, care should be exercised to avoid the serious results of unskillful treatment.

ADAPTABILITY TO CROPS GROWN

Corn normally occupies approximately one-third of the cultivated acreage of the State. Soybeans, grown alone for all purposes occupy less than 10 per cent of the acreage devoted to the production of corn, and many experiments have shown that when interplanted with corn the combined yield per acre is no greater than the yield of corn grown alone. According to the *Farm Forecaster* the average yield of corn per acre for the State was as follows: 1927, 22 bushels; 1928, 18 bushels or an average of 20 bushels per acre for the two years mentioned.

The same authority gives the average yield of soybeans per acre during the same two years as follows: 1927, 16 bushels; 1928, 12 bushels, or an average of 14 bushels for the two years. Therefore, the average yield of soybeans per acre is shown to be 30 per cent less than the average yield of corn.

It is conceded by all who are familiar with experimental data that soybeans are not as efficient as corn for feeding hogs, and owing to the low quality of the carcasses of hogs which have eaten any appreciable quantity of them, hogs so fed are docked from $1 to $3 per 100 pounds live weight.

Furthermore, during the time of the year when soybeans are available in the field the average seasonal price trend of hogs is downward with the result that at an average of the last nine years, prices paid for the two grades of hogs during the two months of September and December, a 200 pound corn fed hog was worth more in September than a 300 pound "oily" hog was worth in December.

If the actual farm cost of production, based on the amount and cost of the crops and proper supplements (Fish meal or tankage) are compared, when soybeans are planted for hogs it actually costs more to produce an "oily" so called "cheap" hog than it does to produce a high grade, market-topping, corn fed hog providing the latter has been constantly full fed on corn, properly supplemented.

The acreage of peanuts is also less than 10 per cent that of corn. The feeding of them occurs at practically the same time of the year as does the feeding of soybeans. The effect on the carcass is similar, and the effect of the average seasonal price trend is the same. Being more palatable than soybeans, pigs will make better gains on peanuts, but to leave them in the

peanut fields so long that they are docked for lack of quality is a serious mistake which is repeatedly made as shown by returns for hogs from some sections of the State where peanuts are grown.

A little saving in the feed cost of a few pounds gain may result in dockage of the entire hog which is also sold at a lower price.

REGIONAL ADAPTION OF COMMERCIAL PORK PRODUCTION

The production of hogs for market should be looked upon as a method of increasing the profit from corn grown on the farm where the hogs are fed. Other things being equal, the cost of producing corn will govern the profit from feeding hogs.

When regarded from a regional standpoint, those sections which produce the most corn would naturally also be expected to sell the greatest amount of pork. From the standpoint of numbers, that is the case in North Carolina, but it is *not* invariably true from the standpoint of pounds. The farm as a whole must be considered before specific recommendations for pork production are made. The hog, while a grazing animal, is not a ruminant, and cannot, like cattle make profitable use of a large amount of pasture or roughage. Therefore, on a mountain farm, the nature of which makes a large percentage of it better adapted to the growing of pasture and hay rather than corn, it may be more profitable to use the corn raised on the farm as a supplement to the pasture which is grazed by dairy cattle for instance, even though the corn with a comparatively small amount of the pasture might return a greater profit if converted into pork.

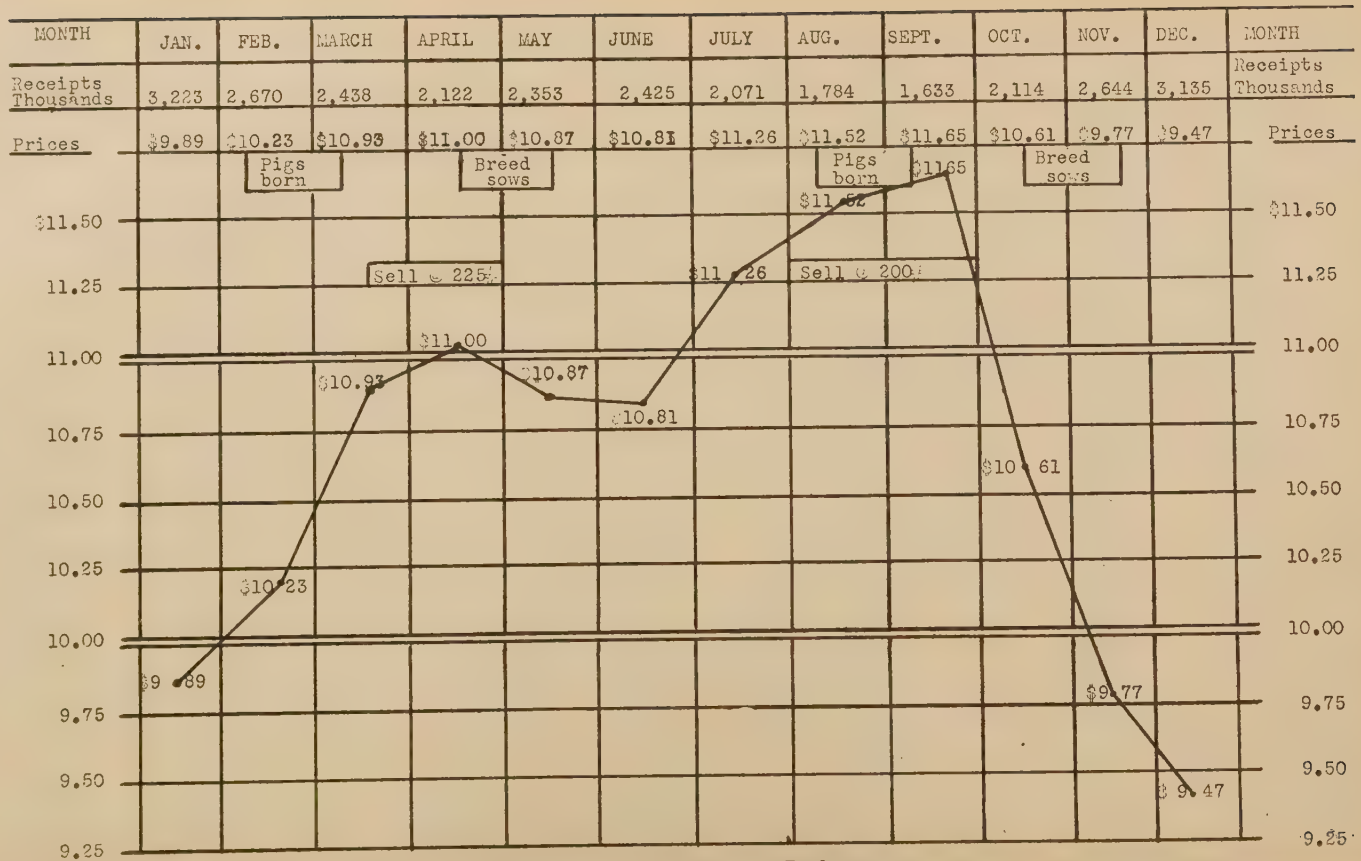
In the eastern part of the State where it is possible to produce an abundance of corn, and where, pastures comparable with those in the western section of the state are rare, ruminating animals will find it difficult if not impossible to compete with the hog with his small pasture requirements from a strictly profit standpoint. When returns are measured by the human labor involved in their production and marketing, corn converted into pork in accordance with the system recommended will be found to compare very favorably with other crops when considered over a period of five or more years.

A WARNING AGAINST THE USE OF SOYBEANS AS A FEED FOR MARKET HOGS

In feeding hogs for market, even though the animals are sold at the same price per pound, cost of gain alone does not govern profit.

As market hogs are sold by weight instead of by the dozen, rate of gain and quality of product are also important. Add to these the average seasonal decline in general hog prices which occurs at a time of the year when soybeans are usually grazed and that crop is shown to be unprofitable as a feed for market hogs.

Those who have not made a study of experimental data and the average seasonal price trend will question that statement. It is nevertheless a fact, and those who doubt it are reminded that an opinion concerning a fact, whether it is right or wrong, does not affect the fact, but it may easily affect the income.



A chart to guide Market Hog Producers

When the farm cost of production is subtracted from the amount received for the hogs, it will be found that several hundred thousand dollars of potential profit is sacrificed each year through limiting the feed of market hogs while they are running on pasture during the summer, and later through partial starvation, compelling them to glean soybean fields. As a consequence the rate of gain and the quality is lowered while, as an average, the price also declines.

Pigs running on a good pasture and fed a one-half ration consume approximately three times as much pasture and make less than half the gain made by pigs that are self-fed corn and fish meal or tankage on good pasture.

Market hogs are sold by weight rather than by the dozen. Records are essential

Land of sufficient fertility to produce 30 bushels of corn per acre or more, will produce from one and a half to twice as much grain when planted to corn as when planted to soybeans. Under average conditions hogs intended for market will not pay for the soybeans, so under the customary method of handling hogs, all this source of needed hay is sacrificed.

Until farm records of the cost of production are kept, extreme care being exercised to see that they are accurate, and local publicity given the results, farmers will continue to suffer this loss; therefore, carefully conducted feeding demonstrations are strongly recommended.

There is no problem in connection with the marketing of hogs in car lots.

OBSERVATIONS REGARDING FEEDING MARKET HOGS

Corn supplemented with skimmilk, buttermilk, tankage or fish meal is usually fed at a profit to good animals which are fed to a weight of 200 pounds or more and sold when recommended.

In comparing the price of corn with the per ton price of other feeds, use also the per ton price of corn; it helps in deciding which is the cheaper.

Corn at $1 per bushel is $35.71 per ton, or $1.79 per 100 pounds.

Barley. This crop may be substituted for corn as a hog feed. While it is not as efficient as corn for market hogs, the yield of barley per acre, coupled with the fact that it matures early in the season and may be used while the corn crop is maturing, makes it well worth consideration by the farmer who is producing hogs for market. A short corn crop may be followed by barley to be used in feeding pigs farrowed the following spring and which are to be sold during August or September of the same year. Barley should be harvested, threshed and coarsely ground before feeding.

A protein supplement similar in variety and amount to that recommended for corn is satisfactory.

Wheat. From the standpoint of feed value wheat may be substituted for corn, but its market value is seldom low enough to justify such substitution. If fed at all it should be ground. Contrary to a common belief, ground wheat will not take the place of its by-products, red-dog or middlings. The percentage of digestible protein in wheat runs from 8.5 to 9. while that of red-dog and middlings averages over 14 per cent for three grades of both.

Wheat mill-feeds. When their cost is measured by the feeding results, mill feeds are an expensive feed as compared with corn and fish meal or tankage. They should therefore be fed sparingly to young pigs, as they seldom if ever increase profit when fed to hogs weighing over 75 pounds.

Oats. Oats contain a rather high percentage of crude fiber; too high, in fact to make them profitable as a considerable portion of the feed for heavy hogs which are being fattened for market. They are excellent for the breeding herd when their cost and price is such as to make their use economical. When considering oats, the weight per bushel should be kept in mind.

Rye. This crop is of rather low average yield per acre. It usually sells for as much or more than corn, and is less palatable than corn. This is probably, at least, partially, due to its sticky nature when ground. The amount of pork which can be produced per acre of rye on fairly fertile land, when compared with the gain from an acre of corn on similar land, discredits rye as an economic feed for hogs.

Pasture. Pasture should be provided for all classes of hogs but it should not be depended upon to replace any portion of a full feed of concentrates for hogs intended for market. To state it another way, a good pasture should be provided and concentrates should be either self fed or full fed by hand with a view to making every pound of gain possible.

REMARKS ON FEEDING

Good self-feeders are recommended for use in feeding hogs intended for market. They should be well built of good material. A poor self feeder made of rough material and carelessly thrown together is an expensive abomination. Where self feeders are used, the expense of grinding corn is saved, but the small grains should be ground.

Supplemental feeds should be kept in compartments by themselves and the animals allowed to balance their feed according to their individual requirements. Where a feeding floor is available the expense of shelling may be saved by feeding corn on the ear and the supplemental feed through self feeders.

The presence of a self feeder in a hog lot is not necessarily conclusive evidence that the hogs in that lot are well fed. For the most profitable results the feeder must contain proper feeds and also function properly. They all clog more or less frequently, and the supplemental feeds give the most trouble in this respect. The corn hopper should not be set to feed so freely as to allow waste.

Blue prints of a good self feeder may be obtained of the Office of Publications, State College, and specific directions for feeding market hogs of all weights are available at the same source by asking for Extension Circular number 143.

Balanced Rations

Specific directions for balancing the feed for market hogs of various weights are given below.

When hand feeding is practiced, the most profitable result will be obtained by balancing the feed acording to the weight of the animal fed. This may be done by following the four formulas given below in which a maximum use has been made of corn which is almost invariably the cheapest hog feed, when properly supplemented.

A pig started at 35 pounds and full fed according to these formulas to a weight of approximately 200 pounds would receive only 50 pounds each of wheat mill feed and fish meal or tankage, the balance of the concentrates being corn, either whole or in the form of meal, the latter being used as a carrier for the highly concentrated fish meal, which makes unnecessary a more liberal use of the wheat mill feeds, the expense of which is high when measured by the return from feeding them.

It is thought that home grinding or a toll of one-eighth is well repaid, but the purchase of corn meal at retail price or the payment of more than one-eighth for grinding is not recommended.

For Weaning Pigs

To make ten 35 pound pigs weigh 60 lbs. each

Slop Mixture No. 1

Fish meal or tankage	1 part	100 pounds
Corn meal	1 part	100 pounds
Red Dog or wheat shorts	2 parts	200 pounds
Slop Mixture	4 parts	400 pounds
Corn, fed separately, dry	4 parts	400 pounds

For 60 Pound Shoats

To make ten 60 pound shoats weigh 100 lbs. each

Slop Mixture No. 2

Fish meal or tankage	1 part	130 pounds
Corn meal	3 parts	390 pounds
Red Dog or wheat shorts	1 part	130 pounds
Slop Mixture	5 parts	650 pounds
Corn, fed separately, dry	5 parts	650 pounds

For 100 Pound Shoats

To make ten 100 pound shoats weigh 150 lbs. each

Slop Mixture No. 3

Fish meal or tankage	1 part	144 pounds
Corn meal	4 parts	576 pounds
Red Dog or wheat shorts	1 part	144 pounds
Slop Mixture	6 parts	864 pounds
Corn, fed separately, dry	6 parts	864 pounds

For 150 Pound Hogs

To make ten 150 pound hogs weigh 195 lbs. each

Slop Mixture No. 4

Fish meal or tankage	1 part	130 pounds
Corn meal	6 parts	780 pounds
Slop Mixture	7 parts	910 pounds
Corn, fed separately, dry	7 parts	910 pounds

Mix the slop mixture thoroughly dry, and feed in the form of a thick slop. Each pound of the mixture balances a pound of corn which should be fed separately.

Hogging Down Corn

The practice of hogging down corn is profitable provided it is not allowed to delay selling the hogs until a seasonal break in price occurs. In the central and eastern sections of the State, an early maturing variety of corn which makes a satisfactory yield under normal conditions may be planted early and marketed in late September as pork.

When hogging down corn it should be supplemented with either fish meal or tankage regardless of whether or not the corn was interplanted with soybeans.

The average of five years results of experiments conducted by the Missouri station shows an increase of slightly over 100 per cent in *profit* from hogging down corn and soybeans when tankage was added as compared with omitting the tankage and depending on the soybeans to supplement the corn. The supplement is conveniently supplied through a self feeder.

Where soybeans are present and fish meal or tankage is fed, as a rule the hogs will not bother the ripe soybeans until the corn is pretty well

cleaned up. When this stage of conditions arrives the hogs should either be moved to another field or sold, because much, if not all the profit may be sacrificed by the three fold deleterious combination of deteriorating quality, a serious slowing up in the rate of gain and a seasonal decline in hog prices.

The breeding herd and hogs intended for home consumption or for sale on the local market may be used to glean fields after those hogs intended for shipment. The time of a market hog is too valuable to be spent in running over a field in search for food which when found, he does not like. Besides, a hog's time belongs to his owner, and the manner in which it is spent has economic significance. A man who has little interest in his hogs will derive little if any profit from them.

The Fertilizer Value of Feeds

The plant food value of feeds is a matter of sufficient importance to justify much more attention than it receives. It is an index to the value of livestock husbandry in the maintenance of soil fertility.

The plant food value, at current fertilizer prices of a bushel of corn after it has been digested and evacuated by a hog is about 15 cents. The value of fish meal or high grade tankage is about $2 per 100 pounds, yet the "average" farmer emits a howl of distress when paying $3.50 per 100 pounds for either, while he goes joyously into debt for nitrogen fertilizers which have no value as an animal feed.

BEEF CATTLE

Beef cattle are not as evenly distributed over the State as some of the other classes of livestock; but, on the other hand, are concentrated in two rather definite areas, in the western or mountain counties, and the eastern or coastal counties. This distribution is a natural occurrence, because in these two sections grass is abundant, and good pastures are essential to profitable beef cattle production. There are a number of good beef herds in the western Piedmont area where special attention has been given to the pastures.

Beef cattle are particularly efficient in utilizing pastures and cheap roughages and are therefore of more value to farms which produce these two feeds in abundance.

Certain definite factors should be recognized and emphasized if the beef cattle industry is to maintain its proper place in a farm program. It is therefore reommended that every effort be exerted towards carrying out the following plan of work.

I. **Breeding:**

(a) Mountain and upper Piedmont areas.

Only good purebred bulls should be used and where conditions warrant, purebred cows should be maintained so that breeding stock may be supplied to those who are on the market for such animals. The decline in beef cattle prices a few years ago was responsible for laxness in the matter of good sires. Therefore, when prices again became more favorable, the farmer who continued using pure bred beef sires, was well repaid.

(b) Coastal Plain Section.

The quality of the cattle in this section is not as high as it is in the western part of the State. In fact, there are few purebred herds, most of the cattle being so-called native or scrub. By the use of purebred beef bulls on these native cows the quality of the offspring will be improved and profits increased.

II. Feeding:

(a) Mountain Section.

Since pasture grasses furnish the principal feed in the mountain counties they should be utilized to their fullest extent, and the present system of producing feeder cattle will probably continue to be the most profitable one.

(b) Piedmont Section.

Finishing cattle for market in this territory is desirable, in order that such feeds as are produced under a more general system of farming may be utilized advantageously. The manure from cattle being fattened on these home grown feeds, is valuable in increasing the texture and fertility of the soil.

(c) Costal Section.

The native pastures of this section are not equal in quality to those of the mountain areas. However, there is an abundance of grazing that can be converted into marketable beef at practically no cost except that necessary in the initial purchase of the cattle. This section is also well situated for finishing cattle, in that corn, cottonseed meal, peanut meal and soybean hay are produced in the same or adjacent localities to those furnishing the pasture. Many acres of land in Eastern North Carolina now nonproductive, could be made to return a good revenue if beef cattle were allowed to utilize the native grass and reeds.

III. Marketing:

The spread in price between feeder and fat cattle should be the deciding factor with regard to selling "off grass" or as finished cattle ready for slaughter, unless the need for manure is great enough to offset such losses as may occur during the fattening period.

Marketing centers are within easy reach of North Carolina farmers in case the local markets are unable to handle such cattle as are offered for sale. The marketing problem is, therefore, one that causes the producer of finished cattle little concern. However, both the producer and the buyer of feeder cattle would undoubtedly be benefitted if these feeder cattle could be collected in larger numbers at certain advertised points to be graded and sold according to age, quality, condition and size.

SHEEP

There are two man types of sheep—*the wool type*, those developed especially for wool; *and the mutton type*, those developed primarily for mutton. By far, the greater number of sheep in North Carolina are con-

sidered as a dual type, and consist chiefly of the Shropshire, Hampshire, Southdown, and Dorset breeds.

Sheep are scattered throughout the State but are much more numerous in the western portion. This section is ideally adapted to sheep production because of the good permanent pastures containing plenty of shade and water, an abundance of cheap land, much of which is too steep and rough to cultivate profitably, and more freedom from sheep diseases and parasites. Poor means of transportation and a season which is too short to grow a good many of the field crops, causes sheep raising to be more attractive to farmers in Western North Carolina.

Western Carolina is the ideal section for sheep production

According to the April, 1929, *Farm Forecaster*, there are 101,449 sheep in North Carolina, 39,669 of which are in the counties of Ashe, Alleghany, and Watauga. These three counties, have a little over 39 per cent of the sheep, while they comprise but a little over 2 per cent of the State's area.

While most of the sheep are to be found in Western Carolina this does not mean that they can not be kept elsewhere with profit. The Piedmont and especially the Eastern section of the State have the advantage of a much milder winter and a longer growing season. This enables lambs to be put on the market earlier in the season when the price is considerably higher. By proper utilization of winter pastures and cover crops, the flocks can be pastured the entire year, a thing which is impossible in the mountains. The sheep industry of North Carolina is made up chiefly of small farm flocks of grade animals. However, a few large, pure bred flocks are found.

ESTABLISHING THE FARM FLOCK

Foundation Stock. Select ewes that are healthy, vigorous, uniform, free from disease, not too old, and that carry a preponderance of blood of the breed that is desired to be established. It is best for the beginner to start with a few ewes, and through increase of progeny, gradually build up his flock until it is of suitable size.

Breeding. Use good, purebred sires and attempt to correct in the offspring, through the sire, the faults of the dams. A ram is "half the flock" and sheep probably respond to upgrading faster than any other class of livestock.

If the flock is found to be profitable and well adapted, secure a few good purebred ewes and gradually replace the grades with their offspring.

Selection. Retain only the best inidviduals after the desired number is reached. Cull out all the non-breeders, and those which do not raise good lambs of the desired type.

FEEDING

Pastures. Attempt to furnish grazing as near throughout the year as practical, making use of native and waste pasture, cover crops, winter pastures, stalk and stubble fields. Change pastures as often as possible.

Roughages. Use home grown feeds and supply as much legume hay as possible. Full feed when grazing is not available or during bad weather.

Concentrates. Feed a balanced ration composed largely of home grown feeds. Start feeding the ewes a few weeks before they are to lamb and continue to feed, with the exception of two or three days just after lambing, until pasture furnishes sufficient feed. Feed the lambs a good grain mixture in creeps until a few months old, or longer if the pastures are not good.

MANAGEMENT

Breeding Season. Breed for as early lambs as practical in the area. Get ram and ewes in good breeding condition before turning together. In the mountain section, breed the ewes in September and October; in the Piedmont Section, in August and September, and, in the Eastern Section, in July and August. Vary the breeding season to meet farm conditions.

Remove the ram when the breeding season is over to avoid late lambs, which throw the ewes out of line for another year. Do not breed ewe lambs the first fall and do not inbreed.

Care of Flock Prior to Lambing. Do not keep confined too closely. Get in good strong condition.

Care During Lambing. Keep in warm, dry, well ventilated sheds or barns during bad weather. Feed only good hay and fresh water for first two or three days after lambing and then gradually get on to a feed of about 1.5 pounds of concentrates per day when grazing is not sufficient. Visit the flock the last thing before going to bed at night and the first thing in the morning.

Dock all lambs when about 10 days to two weeks old and castrate all ram lambs that are to be sold for meat.

Provide grain in creeps for the lambs.

Shearing. Shear around the first of May and keep the wool as free from dirt, trash, and burrs, before and after shearing as possible.

Dipping. Dip all sheep and lambs about 10 days after shearing and repeat in 10 days if parasites are numerous.

Drenching. Drench entire flock early in June and if infestation is bad repeat with the lambs at about monthly intervals until frost.

Weaning. Wean all lambs about the first of July so that their mothers will have a resting period before breeding season. This will also prepare for a more uniform crop of lambs the next season.

Put the weaned lambs on the best available pasture, preferably pasture that has not been grazed by sheep that season. Use the older and poorer pastures for the old ewes and milk them out a few times at about one week intervals.

Shelter. The main essentials of sheep barns are dryness and freedom from drafts. Unless lambs are to be dropped in cold weather, no expense to provide warmth is necessary, as the building should seldom be closed. Protection from winter rains and heavy snowfalls is desirable, but the best results may be expected when ewes are allowed access to a dry bed in the open. About 10 to 15 square feet of shelter should be allowed for each sheep. A low shed about 40 feet by 10 feet will be sufficient for 25 ewes and a feed rack.

Dog Hazard. Dogs are a serious menace to profitable sheep production in many localities. Often the dogs are so bad that the sheep have to be shut up every night. This is inconvenient for the farmer, and unhealthy for the sheep, especially in warm weather. Stray, worthless dogs should not be permitted to prey upon the farmers' flocks and some means for their control should be adopted.

Advertisement. Sheep growers should take an added interest in putting before the public what they are breeding and offering for sale. Sheep and lambs should be on exhibit at our community and county fairs, and the purebred flocks of North Carolina breeders should form a large portion of the sheep exhibit at the State Fair.

MARKETING

Lambs. Breeding and feeding should be so arranged that the lambs will be ready for market at around 80 pounds, not later than the 20th of June, and preferably earlier, in the Piedmont and mountain sections, and much earlier in the eastern section. Lambs do not gain and thrive so well after hot weather begins, and too, the price always declines soon after the first of June. Early lambs sell at a premium, and reach the market before the stomach worm infestation becomes serious.

Wool. Keep sheep as free as possible from trash, dirt and burrs before shearing and get the wool on the market as free from foreign materials as possible.

Pack wool in tight bags and store in a cool place until ready for sale.

Organized Marketing. Organize lamb and wool associations and require that all lambs marketed be docked and castrated.

Make coöperative shipments of lambs to the large eastern markets when local demand is not good. Ship a standard product.

Make wool pools and ship coöperatively when local conditions are not satisfactory.

PROGRAM NEEDED

If a constructive but practical and efficient sheep program for North Carolina is properly carried out, it should prove beneficial to our farmers. There is a place on most farms for a small flock of good sheep. Such a flock can be largely kept on what would otherwise go to waste, and will give an added source of income. If the quality of the sheep can be improved, the flocks more generally distributed, a standard product in lambs and wool produced, and more efficient management and marketing carried out, North Carolina will be benefited.

WORK STOCK

The number of horses on the farms of North Carolina on January 1, 1925, was 129,800 and the number of mules 278,611, or a total of 408,411 horses and mules. The Farm Forecaster for 1928 shows that the figures have not materially changed. The Census figures show also that North Carolina has 17 crop acres per animal (horses and mules) 2 years old and older, the great majority of which is 5 years or older.

Assuming that the life of these animals is 15 years, it will be necessary to replace 10 per cent of these animals each year, or about 5,000 per year. To substantiate this statement, the following are figures from health certificates in the State Veterinarian's office, on horses and mules shipped into the State:

1924—Horses, 936, mules, 4,669; **1925**—Horses 471, mules 4,891; **1926**—horses 443, mules 4,721; **1927**—horses 1,144, mules 7,846; or totals of 5,605 in 1924, 5,362 in 1925, 5,164 in 1926, and 8,990 in 1927.

The Census figures show also that on January 1, 1925, there were 3,896 horse colts and 3,057 mule colts under 2 years of age in North Carolina. Therefore, it would take 66.6 years to replace the present horse population and 182.2 years to replace the mule population of the State. This is a serious situation and unless agricultural plans are materially changed there must continue to be imports of 5,000 horses and mules per year. It is becoming more and more difficult to find suitable horses and mules, especially the latter, and the price is constantly on the increase. A serious shortage of these animals is predicted if more general breeding is not established.

At present, it is necessary to replace about 5,000 work animals in North Carolina each year. A conservative estimate of the cost to the farmers is $175 per head, making a total of nearly one million dollars spent each

year by farmers for replacements of their work stock. This constant drain upon the agriculture of North Carolina could be largely avoided by raising at home a large part of the work animals necessary for replacement.

By using suitable mares as work stock, colts may be raised without seriously interfering with farm work. This practice can be successfully carried on in the Piedmont and Mountain sections, where suitable forage crops and pastures are available. Horse and mule colts are chiefly non-cash cost when raised by the farmer. The farmer who raises colts enough for his own replacements, who breaks his colts when they are coming three years old, who works them until they are 6 or 7, who winters them after the work season is over by turning them out on pasture, who provides open sheds to which the stock may have access, who has available straw and hay stacks at which animals may feed, but which are fenced and protected so that waste does not occur, and who provides good pastures where the work animals are turned at night during the working season, is keeping costs down to a minimum, and has no cash outlay for his power except that required for purchase of shoes and harness.

In comparing these costs with motive power, a heavy cash outlay for a tractor should be considered, the life of which is estimated at 6 years. In addition, there is a cash cost for maintenance and operating expense. Both the tractor and truck have a place in present day agriculture, but good horses and mules also have an important place, especially on small farms. The economical value of motive power, when properly used, as for instance the hauling of farm produce a long distance to market is not questioned, but the short hauls can be made more economically with horses or mules.

One of the chief reasons for farm depression has been a surplus of farm crops going to the market. The decrease in horses and mules in the United States has released about 21 million acres of land or the production of grain crops, or meat animals or cotton. The net result is we have more surplus farm products than the market can absorb. It is rather remarkable that the American farmer has permitted and assisted in reducing the number of horses and mules in the past nine years and in doing this has destroyed a market capable of using the crops from 21 million acres. Many have been influenced by constant propaganda, none of which gave warning that the 21 million acres of land that were supporting horses and mules would at this time be producing surplus crops to demoralize the market.

The following recommendations are made regarding work-stock:

1. That immediate plans be made in a systematic way to encourage the breeding of suitable horses and mules in North Carolina.

2. That assistance be given in securing suitable work mares and in securing suitable stallions and jacks and placing them with individuals and organizations.

3. That information be given in regard to breeding, feeding and rearing.

4. That widespread publicity be given to the economic value of horse and mule power on farms and the value of these as a market for our crops.

5. That demonstrations of large hitches be taken up in coöperation with the Horse Association of America, holding such demonstrations at fairs, community gatherings and other farm meetings.

POULTRY

The possibilities of the Poultry Industry in North Carolina are just beginning to be realized. Poultry raising brings quick returns and involves a small capital investment in land, buildings, and equipment.

Poultry serves a two-fold purpose on the farm; first, as a food for the family; and second, to furnish a steady cash income when the surplus is marketed. On many farms the number of fowls kept could be increased 200 per cent. Larger flocks would produce greater profits without a very large cash outlay. A flock large enough to justify the use of an incubator and a brooder should be maintained. Natural means for hatching and brooding work well on a small scale, but for early hatching, more uniformity in the age of the birds and for economical production, good incubating and brooding equipment are necessary. When day-old chicks are purchased a good brooder is necessary.

In order to develop a balanced program of profitable farm poultry production and marketing the following program is suggested for this State.

STANDARDIZATION OF FLOCKS AND PRODUCTS

To standardize the farm flocks and poultry products calls for the adoption of poultry in the farm program and the slogan of at least 100 purebred birds on every farm to which poultry is adapted; to increase the number of poultry kept on the farm 200 per cent; the keeping of only one breed on the farm and where possible the standardizing of one breed for a community or county in order that the products may be standardized and a reputation for the breed and its products established for the community as an aid in marketing. Eggs should weigh at least 22 ounces per dozen.

FEEDING

The feeding program would consist of the adoption of an economical, year-round feeding system for all farm flocks; to encourage the feeding of a balanced ration throughout the year, by using home grown feed or commercial feeds, and to establish the value and need of green feed; to supply pasture for the farm flock at the rate of one acre for each one hundred fowls kept. The following crops are recommended for green feed or pasture: alfalfa, clovers, oats, wheat, barley, rye and rape. Use the feeding schedule as recommended by the Extension Service and Poultry Department.

Baby Chick Starter. After chicks are 48 hours old give them grit and sour milk to drink. Give milk in containers other than tin so they cannot get wet with it. After chicks are 60 hours old if they are lively give them their first feed. If they are not lively delay feeding until they are 72 hours old. When feeding begins, give the chicks water with the chill off and in founts so they cannot get wet. Feed the following dry mash in hoppers from the start until chicks are 8 weeks old.

Mash	Scratch
30 lbs. yellow corn meal	30 lbs. cracked yellow corn
20 lbs. heavy oats finely pulverized	20 lbs. cracked wheat
20 lbs. wheat middlings	10 lbs. pinhead oats
16 lbs. fish or meat meal 55% protein	Begin feeding scratch at end of first week.
10 lbs. wheat bran	
4 lbs. steamed bone meal	
½ lb. iodized table salt	

If chicks or growing stock are confined in brooder house, add one pint of a biologically tested cod liver oil to each 100 lbs. of mash.

Growing Mash and Scratch. Begin feeding growing mash and scratch when chicks are eight weeks old and continue feeding until eighteen weeks old.

Mash	Scratch
28 lbs. yellow corn meal	40 lbs. yellow cracked corn
20 lbs. heavy oats pulverized	30 lbs. whole wheat
20 lbs. wheat middlings	30 lbs. heavy oats
17 lbs. fish or meat meal 55% protein	
10 lbs. wheat bran	
4 lbs. steamed bone meal	
1 lb. iodized table salt	

Laying Mash and Scratch Feed. Gradually change from growing mash to laying mash.

Mash	Scratch
25 lbs. yellow corn meal	60 lbs. yellow cracked corn
20 lbs. wheat middlings	40 lbs. whole wheat
20 lbs. heavy oats pulverized	
20 lbs. fish or meat meal 55% protein	
10 lbs. wheat bran	
4 lbs. steamed bone meal	
1 lb. iodized table salt	

Scratch feed should not contain over sixty per cent corn. In addition to the above mash and scratch, charcoal and oyster shell should be kept in front of the birds at all times. Give green feed from beginning to end. Alfalfa, clovers, rape, oats, barley, rye and wheat make excellent green feed if fed while young and tender.

Substitutions may be made as follows: Barley may be substituted for oats, pound for pound. The above rations may be supplemented with milk at all times. The feeding of animal protein from two sources is recommended, such as fish meal and meat meal.

If all feed is supplied during the whole year the average laying hen will eat 50 pounds of grain and 35 pounds of mash. One hundred hens will need 5,000 pounds of grain feed. For this it will require approximately 54 bushels of corn and 34 bushels of wheat. The hens will also need 3,500 pounds of mash feed. For this it will require 16 bushels of corn, 22 bushels of oats, 18 bushels of wheat to be exchanged for bran and shorts. If the farm keeping 100 hens will raise 52 bushels of wheat, 70 bushels of corn,

and 22 bushels of oats, it will be necessary to purchase only 700 pounds of fish or meat meal, 140 pounds of steamed bone meal, and 25 pounds of iodized table salt.

HOUSING

A better understanding of the essentials of poultry house construction and of the proper methods to employ in construction and location of buildings must be created; all houses should be built of standard size and with proper ventilation; the brooder houses must be large enough to accommodate 300 to 400 baby chicks and so constructed that they may be easily moved; the laying houses are built 20 feet deep and extended to the length necessary to house the flock, allowing 3½ to 4 feet square feet of floor space for each bird to be housed; floors in laying houses should be of concrete.

Poultry has proven its worth as a cash crop on the farms of this State

HATCHING

The establishment of community and county hatcheries are to be encouraged wherever deemed advisable and no hatchery should be located in close proximity to poultrymen; the hatching of early chicks and the keeping of pullets up to the number necessary to balance the farm flock must be encouraged and the late hatching of heavy breeds discouraged; the hatching of light breeds to be kept as layers from March 1st until May 1st is needed; from 1/2 to 2/3 of the flock each year should be replaced with pullets unless production records show that it is advisable to keep more of the hens for breeding purposes; a uniform price scale for custom hatching should be adopted; and the purchasing of good chicks from blood tested stock produced in North Carolina needs to be encouraged.

CULLING

A program of culling would encourage the systematic culling of the farm flock at least four times per year, using suitable markers to mark the fowls laying each time, so as to be able to select a better breeding pen at the close of the year by using only the hens for breeders that have four markers on them and show signs of having been high producers as determined by the standard culling chart; to teach the proper methods to employ in culling and show the necessity of culling; to develop the fattening and marketing of poor producers and uneconomic birds.

DISEASE AND PARASITE CONTROL

Reduce to a minimum the possibilities for contraction and spread of diseases and intestinal parasites; encourage the use of the triple yarding system for poultry and turkeys; deworm all pullets, if post mortem findings warrant such treatment, just prior to placing them in laying quarters; encourage the building up of disease free flocks with vigor and high resistance; blood-test all birds regularly until the flock is accredited or disease free; isolate promptly all sick birds, cremate all dead ones, and practice rigid sanitation at all times.

RECORD KEEPING

Keeping a simple and practical set of records whereby the cost of incubating, brooding, putting pullets into lay, the cost of production of eggs and the price trend for each county may be determined for every month in the year. This should also give information on the hen margin over feed cost per month and per year, the average flock production per month and per year, and the feed consumption per month and per year; Continue the record work looking to a central certification plant at the college where poultrymen can send pens of birds each year to be trapped and certified as to egg performance and subject them to registration if their performance merits such. Those certified will be sent back to the farm and used as a breeding pen to furnish a source of pedigreed cockerels for breeding purposes as a means of increasing the flock production.

SUPPORTING POULTRY SHOWS

Much is needed to be done to show the value of poultry shows and to encourage the making of exhibits at community, county and state fairs in order to stimulate interest in Standard bred poultry and to learn how to select and what to select for good breeders for exhibition purposes and for egg production. County fairs should add a Standard production class of Rocks, Reds, Leghorns and Wyandottes to the Premium List.

TURKEY PRODUCTION

Turkey production needs to be increased in the State with especial attention given to a decrease in the heavy losses from disease and parasites by the adoption of the confinement method of production; better feeding, housing, care, and management of the flock should be encouraged and the turkeys ought to be kept only on ground not used by chickens.

SUMMER CARE OF EGGS AND MARKETING

Produce infertile eggs in the summer months to prevent bad eggs from reaching the markets and thereby increase the value of eggs for storage purposes; standardize and grade for marketing purposes in an effort to place the North Carolina egg on an equal basis on the national markets with eggs of other highly commercial states; encourage the marketing of eggs regularly, at least twice each week; encourage the adoption of the grading standards for eggs as recommended by the State Department of Agriculture, and further stimulate the carlot sales of poultry.

ORGANIZATION

The establishment of organizations of people who are interested in poultry in each community and county into a real live poultry association in order to bring together organized forces to create a better buying and selling power is needed. This would help extension workers to disseminate more information on the practical handling of the farm flock. Boys and girls must be encouraged to work together in groups on poultry projects and wherever possible replace the mongrel flock with a purebred flock, using the 4-H Clubs as the medium through which this exchange is made. The local or community organizations should be consolidated into county poultry associations with the idea of building a state poultry association. Poultry tours might be conducted by these associations in order to acquaint the members with what other poultrymen are doing.

BEEKEEPING

Extension work in beekeeping was begun at State College in 1916. Prior to that time, the State ranked low in honey production and the opportunity for the industry offered by the climate and honey producing plants in the state was not fully appreciated. There were only twenty beekeepers in the State who owned as many as one hundred colonies of bees. Several of these were using the old style box hives and round gums from which no profit could be obtained. The low average yield and inferior quality of honey produced was largely due to improper methods followed. The industry was disorganized and unprofitable.

The chief reasons for establishing beekeeping extension was to help establish the industry in its proper place among the other agricultural industries of the State, and to aid beekeepers in becoming more successful honey producers with their colonies housed in modern hives and yielding substantial returns.

Beekeeping is sufficiently interesting to attract men of ability. It is sufficiently remunerative to make it as attractive as almost any other branch of agriculture. In it there is as much room for development as in almost any other line of rural occupation. Commercial beekeeping, or at least honey production for home consumption, should appeal to all farmers who now have bees which are not yielding substantial returns.

Those who are making a commercial success are using modern hives adapted to the natural instincts of the bees and to the convenience of the operator. Furthermore, they are interested in the study of the behavior of bees and the beekeeping practice and manipulations which guide the instincts of the bee toward better honey production. Those who are using box hives, or other hives, from which no profit is obtained, should be encouraged to adopt modern hives and to apply modern and approved methods of beekeeping practice, in order that they may increase their honey production for home consumption and for commercial purposes. The standard ten frame hive is recommended and is easy to obtain.

A program for the advancement of beekeeping should be promoted with increasing efforts to give information on all phases of beekeeping until the masses of beekeepers are well informed in the proper management of their apiaries. This is necessary that they may keep their bees healthy and thriving, producing maximum yields of honey in the most attractive form for marketing. Such a program should encourage the organization of beekeepers in solving their problems and the further development of the resources of the State. Lectures and demonstrations on the behavior of bees and their management given in coöperation with County Agents and others interested in the development of agriculture, including boys and girls clubs, classes in agriculture, county beekeeping clubs, and meetings of beekeepers are needed. Further encouragement should be given by correspondence and sending circulars and bulletins on the different phases of beekeeping. The program should encourage proper preparation of honey

for market, including standards and grading and, by coöperation, to assist in marketing. Research work and the courses in beekeeping at State College need to be strengthened and enlarged.

Advancement in Beekeeping Since 1910

Number of colonies in State in 1928	214,945
Value of production in 1910	$ 468,914
Number of colonies in State in 1928	214,945
Pounds of honey produced approximately	13,326,590
Value at present price 20c	$2,665,318

HIVES AND EQUIPMENT

About 40 per cent of the bees kept by farmers are unprofitable on account of being housed in old style box hives and round gums or other inadequate hives. Failure to provide a sufficient number of supers to hold the surplus results in lower production with many who are using the modern hives.

Recommendations.
1. Adopt and use the standard 10-frame hives.
2. Use comb foundation to avoid the rearing of drones.
3. Encourage use of two-story hives or food chambers.
4. Use enough supers to hold the surplus honey—four supers per colony in Eastern section—two to three in Piedmont and mountain sections.

Methods.
1. Coöperative purchase of hives and equipment.
2. Transfer the bees to modern hives during the spring honey flow.

RACES AND STRAINS OF BEES

More than half the bees in the State are the common black German bees and their hybrids. Honey production and the pleasure of beekeeping could be increased by introducing more energetic and gentle races of bees. Black or German bees are more subject to European foulbrood than are Italians and some other races. This disease usually kills all the black bees in any locality where it appears but, with proper management, the Italians are not seriously affected.

Recommendations: Encourage the adoption of Italian bees or some other race resistant to European foulbrood as Concasins corniolians.

Methods. Superseding black or hybrid queens with Italian queens will change the apiary to Italian bees.

APIARY MANAGEMENT

Most failures in honey production are due to improper management of the bees during the fall and winter months, and during the honey flow. Many farmers do not practice any management except to hive swarms and harvest the honey if the bees happen to make any. In the absence of intelligent management there can be no assurance of a profitable harvest,

and only those colonies which by accident have favorable environment give any surplus. Suitable environments can be designed which will result in a certainty of honey production except in seasons of absolute failure in nectar secretion. It is seldom that a failure is had in the season but altogether too common for the beekeepers to fail to provide suitable environments for his bees.

Recommendations.

1. To enourage the adoption of beekeeping practice which will result in all colonies being strong in energetic workers at the beginning of the honey flow.
2. To provide conditions having a tendency to keep the gathering and storing insects of the bees dominant during the honey flow.

Methods.

1. **Fall Management:**
   a. Providing environments favorable for brood rearing. (Bees emerging before September 1st die of old age during winter).
   b. Food supply to never be below 15 pounds of honey during fall. Forty pounds are necessary for winter.
   c. Young queens must head the colonies.
   d. Encourage giving the bees protection.
2. **Spring Management** in regard to rapid brood-rearing and development of the strength of the colony.
3. **Management during the honey flow;** in regard to swarm control, queen-rearing, honey production, treatment of diseases and other apiary practices.

AGRICULTURAL ENGINEERING

Agricultural Engineering is that part of agriculture which requires the application of the principles of engineering together with those engineering practices which are applicable to agriculture.

The following farm practices and phases of Agriculture would be included in an agricultural engineering program for the State:

1.—Land Drainage.
2.—Terracing.
3.—Land Clearing (stumping)
4.—Irrigation (conservation of moisture).
5.—Farm Machinery and Its Economic Use.
6.—Farm Buildings (design and construction).
7.—Farm and Home Conveniences: water, heating, lighting, and sanitation systems.
8.—Rural Electrification.

UNPRODUCTIVE LANDS

One of the most serious problems with which the North Carolina farmer must deal is the management of unproductive lands—those lands which are producing neither farm crops nor timber. The 2,300,000 acres of such lands represent an area nearly one-third as large as the entire cultivated area.

Recommendations:

Each acre of farm land in the State should be made productive and profitable so that the cultivated area need not carry the entire burden of investment and taxation.

Methods:

Develop these lands for:

1.—The production of crops.
2.—Pastures for Livestock.
3.—For the production of timber.

DRAINAGE

About 15 per cent of all the cultivated lands in the State, or an area of about 1,180,000 acres, are being cultivated unprofitably on account of poor drainage. If to this is added the 1,700,000 acres or about 51 per cent of the sub-marginal lands of the State that have been abandoned on account of inadequate drainage, there are 3,350,000 acres of land which requires better drainage. This area is equal to about 23½ per cent of all the farm lands.

Recommendations:

1. Plant no wet land—land on which crop failures in the past were caused by inadequate drainage.
2. Discourage the draining of large areas of wet unproductive lands for the purpose of bringing more lands into agricultural use.
3. Encourage the draining of small "wet spots" in otherwise well drained fields.
4. Drain the small wet areas which cut up the farm into a large number of small odd shaped uneconomically operated fields.
5. Keep streams and drainage channels open.

Drainage Methods:

1. Surface Drainage—For Flat Lands:
   Protect all crops from damage by heavy rains with a system of surface drains located and constructed similar to terraces.
2. Install systems of tile in place of small lateral ditches which tend to divide the field into small patches.
3. Encourage the coöperation of farmers in their efforts to keep the main drainage channels open.

TERRACING

The common practice in past years, especially in the Piedmont Plateau, has been to farm a piece of land, wear it out, turn it back to pines and clear a new area. No doubt, during the last 50 years at least one-half of the Piedmont farm area has passed through this costly cycle. Labor is too expensive to continue this practice. Experiments conducted on the State College Farm, Raleigh, N. C., show that from four to six times as much plant food is lost from erosion as is used for growing crops. It is known, therefore, *that lands not only wear out, but wash out. If soils are conserved with a good system of terracing the need for soil building will be reduced to a minimum.*

About 3,800,000 acres, or roughly 50 per cent of cultivated land in this State, is subject to erosion and would pay good dividends for an adequate system of terraces. If the 49 per cent of marginal lands, or 1,130,000 acres is added to the eroding lands, the total eroding area of farm lands approaches 5,000,000 acres. A small percentage of these lands has already been terraced, but the real problem of soil conservation is still in its infancy.

Recommendations:

1. Establish terracing or erosion control projects on a number of the State Farms.
2. Encourage terracing on all farms on which erosion is a factor limiting agricultural prosperity.
3. Stop gullying with soil saving dams.
4. Encourage reforestation and a sane method of forest management.

Terracing methods:

1. Coöperative purchasing and use of farm levels and terracing machines.
2. Establish terracing schools over the state.

Note: In addition to the approximate 5,000,000 acres of farm lands which are subject to erosion there are probably more than 6,000,000 acres of cut-over land eroding.

LAND CLEARING

There are millions of acres of waste, cut-over and timber lands that can be cleared and used for the production of farm crops. However, at this time all thought along this line should be discouraged. The land clearing problem is not one of clearing more acres, but the improving of lands now under cultivation. Based on the distribution of Surplus War Explosives and in ridding farm lands of tramp stumps and boulders, there are more than 500,000 acres of stumpy lands being cultivated today.

Recommendations:

1. Discourage the clearing and developing of large areas of new lands.
2. Assist farmers and encourage them in the ridding farm lands of tramp stumps and boulders which smash farm machinery and prohibit the economical production of farm crops.

Methods:

1. Coöperative purchase of explosives.
2. Coöperative purchase and use of stump pullers.

IRRIGATION AND THE CONSERVATION OF MOISTURE

North Carolina has a humid climate. The annual rainfall is ample in all years to produce crops without loss from drought. The droughts that occur are not caused by insufficient rainfall, but rather by the unequal distribution.

Recommendations for Conserving Moisture.

1. Construct level terraces or terraces having a fall that, normally, does not exceed two inches in 100 feet.
2. Sub-soil heavy, tight, impervious lands.
3. Encourage the Irrigation of gardens and truck farms.

FARM MACHINERY AND ITS ECONOMIC USE

A study of production costs in North Carolina compared with various other states or sections shows that farms are being operated inefficiently.

1. Corn profits in North Carolina could be increased 80 per cent by lowering the production costs of plowing, planting and cultivating to the average cost level of Iowa farms.

2. A Wheat Belt farmer produces a bushel of wheat with 18 minutes labor, but it takes the Southern farmer 150 minutes.
3. The cotton farmer of Western Texas produces 2 1-3 pounds of lint cotton per hour with the same labor used in the Southeastern States for producing one pound.
4. The Northern farmer produces 2 1-2 bushels of potatoes per hour while the Southern farmer produces 1 1-2 bushels.

Among all the states, North Carolina stands third in crop value per acre but thirty-ninth in productive value per farm worker. This shows that it is not the yield per acre, but the *yield per worker* that measures prosperity.

Recommendations:

1. Use the following formula for organizing the farm:

(*Selling Price* minus *Cost of Production*) multiplied by *Quantity Sold* equals *Profits.*

2. Use machines that permit lower production costs.
3. Use machines that increase the production per farm worker.

Methods:

1. Use larger teams (drive more mules) for plowing, discing, planting, etc.
2. Use gang plows, discs, two row planters, fertilizer distributors, one and two row riding cultivators, transplanters, and improved harvesters.

FARM BUILDINGS, DESIGN AND CONSTRUCTION

As one observes the condition of farm buildings in the State, it is not difficult to see that they are inadequate for the successful handling of livestock, for the proper and economical storage of farm products, and fail in many instances to provide the proper comforts and protection for the families. This probably causes an annual loss in livestock amounting to several million dollars and a loss in grain and other farm products exceeding $13,000,000 per year.

Recommendations:

1. Construct buildings that will—
   (a) Make better living conditions.
   (b) Permit the more profitable production of livestock.
   (c) Reduce losses caused by rodents and weather.
   (d) Present an attractive appearance.
   (e) Provide economic service.
2. Paint buildings to prolong their usefulness.

Methods:

1. Have buildings designed for North Carolina needs and climate.
2. Use permanent construction materials.
3. Make buildings as nearly fire-safe as possible.
4. Use rat-proof construction.
5. Paint buildings for preservation and appearance.

FARM HOMES AND CONVENIENCES

The farm home should be as attractive, convenient and comfortable as a city home. This requires a good, comfortable, and attractive dwelling properly equipped with water, light and heating systems.

Conditions in North Carolina are ideal for so equipping the homes. In many instances an automatic water system will cost less per year than the shoe soles worn out in carrying water.

(a) Water.

The installing of water systems should be encouraged. Water in the home not only saves much labor and drudgery, but also may add many years to the life of the farm women. They may include:

1. Gravity Systems.
2. Hydraulic Rams.
3. Automatic Pumps.
4. Power Pumps.
5. Hand Pumps.

(b) Water supplies of all farm homes should be safeguarded against sewage contamination by providing adequate drainage and sanitary toilets or septic tanks.

(c) Sanitation.

When water is put in the home provision should be made for safeguarding the health of the family in disposing of wastes. Septic tanks are recommended for use in disposing of wastes that accompany automatic water systems.

1. Build community forms for constructing septic tanks.

(d) Lighting.

A good lighting system probably is the next convenience that most people desire. There are many streams in North Carolina, especially in the western half of the state, which can be developed economically to produce power for lighting the home and operating many labor saving devices. Where these sites are available and can be developed economically their development should be encouraged.

(e) Heating.

No heating system however efficient will keep a poorly constructed building comfortable. The suggestion, therefore, is made that farm homes should be properly insulated when built so that comfort as well as economy in heating will be provided.

RURAL ELECTRIFICATION

Cities and industries have been electrified. Farms, likewise, warrant and demand electric service. North Carolina is fortunate in having some counties well equipped with electric service, but this movement should be encouraged to further this service.

Recommendations:

1. Encourage the construction of electric lines.
2. Encourage the use of current on farms for—
   (a) Household conveniences.
   (b) Farm uses.

Methods:

1. Have a joint committee representing power companies and farmers to make an economic study of Rural Electrification problems in North Carolina.

AGRICULTURAL ECONOMICS

SUB-MARGINAL LANDS

The success of any program for agriculture depends upon the removal from cultivation of the poor or sub-marginal farming areas of the state. The occupants of these sub-marginal lands are not able to obtain, under present economic conditions, a decent standard of living. They are, however, a considerable factor in adding to the burdensome agricultural surpluses, thereby tending to depress the price of farm products generally. We believe that these lands can and should be utilized best through a state system of reforestation. Such a system should be put into effect gradually and at the same time every effort should be made to find suitable occupations for the present occupants of these sub-marginal areas.

TYPES OF AGRICULTURAL PROBLEMS NEEDING SOLUTION

There are many economic problems which need to be solved in order to place the agriculture of the State on a sound basis. Attention should be concentrated at present however, on three major groups, namely; the problems of farm organization and management; problems in the marketing of farm products; and the problems of financing the production and marketing of farm products.

PROBLEMS OF FARM ORGANIZATION AND MANAGEMENT

The economic problems of production are in the main those which center around the organization and management of the individual farm. The object of dealing with these problems is to increase farm earnings to the point where the majority of farmers may be able to establish and maintain a reasonable standard of living, thereby insuring their independent existence as a group. Experience and numerous investigations show that farm earnings may be increased by the individual farmer as follows:

1. **The Reduction of Operating Costs, by**

   a. *Establishing a more effective combination of farm enterprises.* There is a tendency among farmers to emphasize the leading or main enterprise. It is often possible, by wise selection and combination of enterprises to effect a better utilization of the available labor, land and equipment. This can be done by adding to the main or principal enterprise supplementary and complementary enterprises.

   b. *Improving Farm layout.*

   c. *Substitution of modern equipment for hand tools and machinery which is out of date.*

d. *Substitution of bank credit for store and merchant credit.*

e. *Refinancing.* Reduction in cost could be brought about by substituting present short-time loans which are being carried at a higher rate for long-time loans at lower rates. With our present banking facilities, there is no reason why farmers could not reduce their costs considerably by making this substitution.

f. *Substituting new and improved methods for ineffective farm practices.*

2. **Adjusting Crop and Livestock Enterprises from Year to Year to Meet Anticipated Market Demands.** Practical use is recommended of the State and Federal Outlook Reports that are issued each year before planting time.

3. **Adjustment of the Economic Unit,** so as to obtain the best combination of land, labor, and equipment with available managerial ability.

4. **Budgeting the Farm Business.** There is obviously a need for farmers to more carefully plan their year's business. This can be accomplished by setting up a definite budget or plan for the use of available land, labor, equipment and other resources. Such a budget should be made with a view to the price which will likely be obtained when the products are ready for the market and not based on the market prices at planting time primarily.

5. **Production for Farm Consumption.** This problem is especially important in North Carolina. A large amount of feed stuffs and agricultural products which are used by farm families is imported. It is an accepted fact that farmers can produce most of the feeds which are required for the workstock, the productive livestock, and food for the farm family. A well-considered combination of enterprises and a careful budgeting of the farm business must necessarily take into consideration the problem of supplying farm feeds and products for the farm home.

Method of Solution

The problems which have been stated can be solved best by—

1. **Keeping Adequate Farm Records.**

2. **Accredited Farm Business.** There is need in this state for a method of giving recognition to those who farm in a businesslike manner. The master farmer movement is not quite sufficient for this purpose. There should be set up machinery for accrediting those farmers who organize and manage their farms according to the best information obtainable.

THE ECONOMICS OF MARKETING

The problem of marketing consists in the main of producing that quantity and quality of products demanded by domestic and foreign markets. These market demands are a reflection of the ultimate consumer's demands and preferences. Today consumers demand high quality of products put up in attractive packages to be sold at reasonable prices. The problem is to be

solved by—1. Determining the consumer's demands and preferences. That is, the quality, quantity and type of package preferred. 2. Reducing marketing costs.

1. **Determination of Consumer's Demands and Preferences.**
   a. *In the case of farm products, the quantity of production which the market will absorb at a given price should be determined.*
   b. *In the case of each product, the market should be studied with the view of determining the quality the consumer prefers.*

2. **Methods of Reducing Marketing Costs.**
   a. *Ship only that quantity and quality which will command profitable prices.*
   b. *Grade and standardize all farm products before shipping to market.* This is especially important in the case of large domestic and foreign markets.
   c. *Utilize state and federal inspection service when and wherever available.*
   d. *Ship coöperatively whenever feasible.*
   e. *Do not ship in haphazard manner, but rather study the market carefully before shipping.* Ship only to those markets which are not likely to be flooded by shipments from competing areas.
   f. *Control production so as to avoid price depressing surpluses or underproduction.*

Method of Solution

These problems can be solved in part by individual effort and in part by state and federal participation. The individual farmer can do much in the way of studying the consumer's preferences and produce the quantity and quality demanded. In fact, no agency can take the place of the individual farmer in this respect. Coöperative marketing is essential in solving some of the marketing problems. Coöperative marketing provides the means of getting volume of business, reducing shipping, grading and other marketing costs. It also provides a means of increasing the bargaining power of the farmer, as the coöperators are usually in a position to bargain more successfully than individual farmers. Coöperatives also have the advantage in that they can employ experts to study various phases of the marketing business. In this manner, coöperatives can often accomplish what large commercial and industrial corporations do.

Auction sales have proved to be an important method of marketing farm products. This method is recommended when conditions are favorable.

When farmers individually or collectively, have done all that they can, there still remain many problems which must be solved before the marketing of farm products is put on a satisfactory basis. The present system of marketing farm products is grossly inefficient. This has been revealed by many studies. A recent investigation shows that the margin between the price paid to the farmers and that paid by the consumer in increasing. In many instances the margin is a very high per cent of the consumer's price. This fault apparently lies with the present marketing mechanism

and requires the participation of the state and federal governments. The solution is beyond the scope of individual or collective effort. There is need for an enactment of legislation controlling more definitely the business methods and practices of private middlemen. The theory that competition would force middlemen to establish high ethical standards is no longer tenable. Until this latter problem is solved the farmer will continue to take lower prices than is necessary for his products.

FINANCING THE PRODUCTION AND MARKETING OF PRODUCTS

Supplying farm credit at reasonable costs is one of the most difficult problems facing the State. The cost of credit in most instances, is notoriously high. Short-time or production credit obtained from merchants and landlords costs approximately 25 to 30 per cent higher than the general credit would cost if obtained from banks, and from 32 to 35 per cent higher on the average than if all purchases of supplies were made for cash.

Farm mortgage credit apparently does not constitute, at present at least, a serious problem of cost. According to a recent investigation it is slightly above 6 per cent.

Methods of Solution

The cost of short-time credit may be reduced in the following manner:

1. **Reduction in the Amount of Credit Used.** The first feature which farmers should consider in improving their credit practices is the possibility of reducing the amount used. Complete self-financing cannot be wisely advised in this age when additional amounts of labor, land or capital may mean greater profits. But the same results often may be reached by less borrowing. Foods, feed and fuel which can be produced readily on the farm are the means suggested most frequently. Insofar as these can be produced more cheaply than by purchase, or produced with the land or labor less well employed for other purposes, the farmer may save credit and credit cost by this method, and often improve his standard of living.

2. **Greater Savings From Income.** A further possible means of reducing amounts of credit needed is by greater saving of income. The extent to which such saving is practicable will vary greatly among farmers, and in many cases can be done only with difficulty. The standard of living generally found does not indicate extravagance or that large savings would be possible without considerable sacrifice.

3. **Shifting the Sources of Credit From Time Merchandising Agencies to Cash Lending Institutions.** In lowering the cost of credit the farmer's first effort must be directed toward shifting the source of credit to cash lending institutions. This single change makes a difference of two-thirds reduction for the average user of merchant credit. Many farmers could borrow from banks by making an effort to do so, while doubtless many of those using both merchant and cash credit could be cared for entirely by the banks if the borrower desired.

4. **Confine Borrowing to a Strictly Per Annum Rate.** Further economy in borrowing may result from borrowing at a strictly per annum rate, where the amount of the charge is directly proportionate to the length of the term. Under this plan the borrower saves by paying his loan as soon as possible, whereas, under the flat charge there is no such inducement.

5. **Substituting Long-Term Mortgage Loans for Short-Term Borrowing.** Owners may often reduce their credit rates by substituting long-term loans for short-term borrowing and putting the funds to work at interest during those months when the capital would be idle on the farm.

6. **Improving the Credit Institutions.** Most farmers probably underestimate their share of the responsibility for shortcomings of the institutions which supply them with credit. The time-price system of merchants credit would soon disappear if farmers closed their accounts and purchased only at cash prices.

7. **Increasing Outside Investments and Accumulation of Reserves.** Probably most farmers need at least as much land as they have in order to have a farm unit which can be operated most effectively. Beyond this requirement farmers may often use available funds to better advantages by investing in state and federal bonds or other sound securities.

THE FARM HOME

Any program of agricultural advancement in North Carolina must include setting up standards of living on the farm which will represent a comfortable, livable home where farm life may give satisfaction.

STANDARDS

The standards here outlined are planned with a view to the economical expenditure of money, time and energy and may be obtained over a period of years as the farm income warrants.

The things to be considered are:

Food and Health of the Farm Family—The amount and variety of foods necessary for maintaining the proper nutrition of the family.

Housing—Condition and size of house, equipment, conveniences, furnishings.

Home Management—Expenditure of time, energy and money.

Home Grounds—Planning and planting.

Clothing—Standards for clothing the family.

The Family's Health.

Child Care and Training.

Marketing the Surplus Home Supplies.

The Farm Community and the Farm Family's Social Activities.

FOOD AND HEALTH OF THE FARM FAMILY

Standards.—Wisely selected, well prepared, and attractively served balanced meals for each member of the family in order that all may have a greater resistance of disease and a feeling of general good health. To this end every farm home should have:

A.—Production.

1. A *garden* that will supply a variety of fresh vegetables for the table every month in the year and during the growing seasons a surplus for canning.

   In addition to potatoes or other starchy vegetables, the daily diet of every person should include at least two vegetables, one of these a leafy vegetable.

2. An *orchard* in which there is a succession of fruits such as berries, figs, apples, peaches, grapes, pears, cherries, plums, and melons to supply daily two servings of fruit, fresh in season and canned or dried at other times.

3. A *canning budget* which shall include a minimum of 57 pints of a variety of vegetables and 45 pints of a variety of fruits per year for each person to supplement the fresh and dried products.

4. A sufficient number of *cows* to supply daily 1 quart of milk and 1½ ounces of butter for each child and 1 pint of milk and 1 ounce of butter for each adult.
5. *A poultry flock* large enough to supply an *egg* a day for each member of the family and a serving of poultry two or three times a week.
6. *Meat animals* in good condition to supply *meat* once a day except when poultry or fish is used.
7. *Whole grain products* in the shape of bread and breakfast cereals that average from ½ to ¾ of a pound per person daily.
8. Desirable *sweets* such as pure cane molasses, honey, dried fruits and wholesome desserts in moderate amounts.

If the health of the farm family is to be maintained not one of the standards named may be omitted.*

B.—Food Preparation.

1. Foods prepared to preserve nutritive value and to give variety.

C.—Table Service.

1. Convenient, orderly, and attractive table service and courtesies.

D.—The Community.

1. Food for health standards in rural community.
   a. Balanced meals for community gatherings.
   b. Hot dish in the school lunch established on a permanent basis in each rural school.
   c. School child of proper weight and free from preventable defects.
   d. Periodic physical examinations in schools with effective follow-up work.
   e. Mother and child clinics in every community.

HOUSING THE FAMILY

Standards.—A home and surroundings planned to conserve woman power and provide healthful living conditions as well as comfort and beauty. To this end every home should have:

A. One sleeping room for every two members of family.
B. A family living room.
C. All doors and windows screened.
D. Water in the Home:
   1. The simplest system includes a pump at the sink, a means of disposal of kitchen waste, and a sanitary privy. This is the minimum for comfort and convenience.
   2. The hot and cold water system includes a pump, a storage tank, hot water tank, a means of disposal of kitchen waste, and a sanitary privy.

*A diet such as outlined above will prevent pellagra, a disease now too prevalent in North Carolina.

3. The complete system is the ideal and consists of a pumping unit, kitchen and bathroom equipment, inside toilet and a septic tank.

E. Lights—Electricity as an ideal. If this cannot be compassed, lamps of high candle power for close work or study.

F. Power driven washing machine and electric iron.

G. Heat:

1. Units to heat rooms used by family.
2. Heating system for the entire house.

Beautiful home grounds may be secured by planting to a plan

The time and energy of the housewife are conserved to the fullest with the installation of the complete water system, electric lights, power driven washing machines, and furnace heat.

H. A wood or coal range and an oil or electric stove for quick service.

I. Kitchen cabinet or built in cupboards for storing utensils, dishes and food supply.

J. Working table of proper height for housewife and a high stool.

K. Provisions for cold storage at 50 degrees or below.

HOME MANAGEMENT

Standards.—The business of housekeeping so organized and conducted that the time and energy of the housewife may be freed for other important homemaking duties. Household resources so administered that the essential needs of the family may be supplied within the available income.

A.—Time and energy resources.

1. Arrangement and equipment of the kitchen for convenience.
2. Labor-saving methods of doing household tasks.
3. Organization of the housewife's time.
4. Equitable division of household tasks among members of the family.

B.—Economic resources.

1. A knowledge of the value of household purchases.
2. Simplified household budgets and methods of accounting which will show quality and durability of goods purchased; how well purchases made fulfill needs of family.
3. The use of old articles through refinishing, making over and cleansing.

C.—Social resources.

1. A spirit of common devotion and interests among members of the family.
2. The home in its responsibility to the community, hospitable entertainment, social gatherings.
3. Child's education.

HOUSE FURNISHINGS

Standard.—Comfortable, convenient and attractive home interiors. To that end every farm home should have:

A. Walls—light and easily cleaned.
B. Floors finished to be easily cleaned.
C. Furniture in good state of repair.
D. A few good pictures properly hung.
E. Windows simply curtained to permit of good ventilation and outside view.
F. Color and arrangement of furniture and furnishings to make a harmonious whole.
G. Provision for music, reading, games, and sociability.

BEAUTIFICATION OF THE HOME GROUNDS

Objectives:

1. All unsightly objects removed or screened by plantings; poultry yards, pig pens, garage, wood sheds, etc., placed in rear; the dwelling and all other buildings and fences in good repair and painted the same color.
2. Home grounds planted to a plan including foundation plantings to tie the house to the ground, trees to frame the house and for shade, corner and border plantings, well placed walks and drives, well kept lawns.

CLOTHING FOR THE FARM FAMILY

Standards.—A wardrobe for the farm family so planned and selected that it will improve appearance, give confidence and poise to the wearer, protect health, and keep within the bounds of the family's income. This will include:

A. Garments well designed for wearer.
B. Colors that are becoming to wearer.
C. Adequate clothing for seasonable wardrobe.
D. Garments suitable for the occasion and use.
E. Shoes, hose, underwear selected for comfort and health.
F. Clothing, well cared for, mended, laundered, cleaned.
G. Children's clothing so designed and constructed that they allow for best development of body and for self help.
H. Storage space for clothing.
I. A sewing room or corner in each home equipped with the following: Sewing machine; iron and ironing-board; table for cutting, the proper height for user; storage space for work, patterns, and fashion magazines; sewing table, basket or bag equipped with good pair scissors, threads, needles, emery, tape measure, thimble, and pins.

FARM WOMAN'S MARKET

Aim.—Turning surplus farm products into home comforts and thereby supplementing the farm cash income.

Objectives.—If conditions are favorable the organization of a once-a-week market for farm women in every county where there is a town with a population of 5,000 or more.

An increase in parcel post marketing of canned goods, poultry, etc., between farm women and various institutions.

Increased county car lot shipments of poultry.

The cash income in some sections of North Carolina is so small that it seems necessary to supplement it by every means possible if the standards here outlined for the farm home are to be compassed. If the farm products vegetables, fruit, milk, butter, poultry, eggs, and other supplies for the family table there is always a small surplus; and successful once-a-week markets may be operated by farm women. Tobacco warehouses or other buildings donated for the use of farm women or the street curb may be used as market places.

The following standards have been worked out by farm women now selling on once-a-week markets:

A. Each one sells the same standard goods at the same price.
B. Each one sells his or her own produce.
C. Everything must be home-grown or home-made.
D. No one is allowed to buy and resell.
E. Only farm producers can sell.
F. No one is allowed to sell before the market opens.
G. No one is allowed to engage or promise her produce before the market opens.
H. Prices are posted on a large blackboard just before the market opens and a small fee is paid by producers each market day to take care of the small running expenses.

AVAILABLE PUBLICATIONS
of the
AGRICULTURAL EXTENSION SERVICE
and
EXPERIMENT STATION

LIVESTOCK AND MEATS

N. C. Extension Circulars:

No. 22. Dehorning Cattle.
No. 119. Preparation of Pork on the Farm.
No. 128. Handling the Products of the Family Cow.
No. 134. Feeding Beef Cattle.
No. 143. Swine Feeders Guide.

N. C. Experiment Station:

No. 243. Wintering and Summer Fattening of Steers in North Carolina.
No. 244. Methods and Cost of Raising Pigs to the Weaning Age.
No. 249. Curing Meat in North Carolina.
No. 253. Methods and Cost of Raising Lambs to Marketable Age.
No. 259. Soybean Oil Meal for Fattening Pigs.
No. 260. Systems of Livestock Farming for the Mountain Region of North Carolina.

POULTRY

N. C. Extension Circulars:

No. 154. Common Diseases of Poultry.
No. 155. Artificial Incubation and Brooding of Chickens.
No. 156. How to Cull Poultry.
No. 161. North Carolina Poultry Houses.

N. C. Experiment Station:

No. 254 I. Cost of Producing Eggs with S. C. White Leghorns, and II. The Control of Roup with Its Effect Upon Egg Production.
No. 264. Causes of Poultry Mortality in North Carolina.

FRUITS AND VEGETABLES

N. C. Extension Circulars:

No. 50. Drying Fruits and Vegetables for Home Consumption.
No. 101. Spraying Calendar for Apples in North Carolina.

No. 103. Spraying Irish Potatoes.
No. 113. Jelly, Jam, Preserves and Pickle.
No. 114. Canning Fruits and Vegetables.
No. 122. Farm and Home Garden Manual.
No. 138. Bordeaux Spray for Truck Crops.
No. 172. Seed Treatment of Irish Potatoes.

N. C. Experiment Station:

No. 248. Anthracnose of Dewberries.
No. 263. Approved Practices for Sweet Potato Growers.
No. 265. The Nematode Disease of Sweet Potatoes.

INSECTS

N. C. Extension Circulars:

No. 19. The Southern Corn Bill Bug.
No. 79. The Fall Army Worm.
No. 104. The Cotton Boll Weevil.
No. 105. Green Clover Worms as a Pest to Soybeans.
No. 174. Control of Tobacco Insects.

N. C. Experiment Station:

No. 239. Tobacco Flea-Beetle.
No. 242. The Green June Beetle or Fig Eater.

TOBACCO

N. C. Experiment Station:

No. 246. Wildfire of Tobacco.

CLUBS

N. C. Extension Circulars:

No. 8. Report of Boys' Club Work in North Carolina.
No. 86. Selected Community Club Programs.
No. 93. A Study in Foods for Home Demonstration Clubs.
No. 139. Ten Lessons in Preparation of Foods and Meal Planning for N. C. Club Women.
No. 145. Clothing Work.
No. 148. Preparation of Foods.
No. 164. 4-H Club Camps.
No. 171. Manual and Record Book for Sheep Club Members.

EXTENSION FOLDERS

No. 3. Milk for the Whole Family.
No. 5. Cow Facts.

No. 8. Tobacco Plant Beds.
No. 13. Produce High Grade Cream.
No. 15. Prevent Leaf Spot Diseases of Tobacco.
No. 16. Save Your Brood Sow.
No. 18. Fertilizers for North Carolina Soils.
No. 19. Corn Fed Profits.
No. 20. Boll Weevil Poisoning for 1926.
No. 21. Measuring the Timber Crop.
No. 22. The Mexican Bean Beetle.
No. 23. Know the Value of Your Timber.
No. 24. Farm Program for 1927.
No. 25. Score Card for Negro Garden Contests.
No. 26. Corn *vs.* Cotton for Profit.
No. 27. Ridge Method of Cultivating Tobacco.
No. 28. Building Permanent Pastures in Piedmont North Carolina.
No. 29. Control of Harlequin Cabbage Bug.

FAIRS

N. C. Extension Circulars:

No. 94. Some Results of Fair Work in North Carolina.

GRAINS, LEGUMES, AND GRASSES

N. C. Extension Circulars:

No. 2. Selecting Seed Corn for Larger Yields.
No. 9. The Soybean Industry in Eastern North Carolina.
No. 56. Soybean Harvesters.
No. 57. Soybeans—A Future Economic Factor in North Carolina.
No. 71. The Growing of Wheat in Eastern North Carolina.
No. 80. Soybean Harvesters.
No. 84. Growing Sweet Sorghum and Making Sorghum Syrup.
No. 85. Soybean Pastures for Hogs.
No. 102. Sweet Sorghum Variety Tests.
No. 106. Improved Seed Wheat for North Carolina.
No. 127. Soybean Growing in North Carolina.
No. 136. Red Clover.
No. 165. Crop Rotations for Costal Plains.
No. 166. Control Covered Smut of Wheat with Copper Carbonate Dust.

N. C. Experiment Station:

No. 230. Variety Tests of Corn for 1914.
No. 241. Soybeans and Cowpeas for North Carolina.

No. 257. Response of Oats and Soybeans to Manganese on Some Coastal Plain Soils.

No. 268. Control of Oat Smut by Seed Treatment.

SOILS AND FERTILIZATION

N. C. Extension Circulars:

No. 32. Soil Survey Work in North Carolina.

No. 70. Composition and Fertilizing Value of Farm Crops.

No. 149. Fertilizers for Tobacco.

No. 173. Terracing Farm Lands.

N. C. Experiment Station:

No. 250. Fertilizer Experiments with Cotton.

No. 255. Influence of Crop Rotation and Soil Treatments Upon The Yield of Crops on Norfolk Sandy Loam Soil.

No. 256. Influence of Crop Rotation and Soil Treatments Upon the Yield of Crops on Cecil Clay Loam Soil.

No. 261. Value of Lime on Cecil Clay Loam Soil.

No. 262. Value of Lime on Norfolk Sandy Loam Soil.

No. 266. Effects of Synthetic Nitrogen and Concentrated Fertilizers on Cotton and Sweet Potatoes.

MISCELLANEOUS

N. C. Extension Circulars:

No. 23. From Wool to Cloth.

No. 62. Home-making of Cottage and Buttermilk Cheese.

No. 65. Food Production Campaign for North Carolina.

No. 73. Industries Using North Carolina Timber.

No. 78. Prevent Smut.

No. 90. Farm Advertising.

No. 118. Farm Fencing.

No. 124. Farming Under Boll Weevil Conditions.

No. 125. The Optimum Diet.

No. 163. Farm Business Program for North Carolina.

No. 169. Building a Program of Agricultural Extension.

No. 170. Common Birds of North Carolina.

N. C. Experiment Station:

No. 240. Composite *vs.* One-Day Sampling of Milk for the Babcock Test.

No. 247. Recent Results of Work and Present Program of the N. C. Experiment Station.

No. 252. Profitable Farm Combinations.

No. 258. Living Conditions Among White Land-Owner Operators in Wake County.

No. 267. Farm Income and Taxation in North Carolina.

TECHNICAL BULLETINS

N. C. Experiment Station:

No. 11. Self-Sterility in Dewberries and Blackberries.

No. 12. Inheritance of Sex in Vitis Rotundifolia.

No. 13. Biological Investigations of Sphenaphorus Callosus.

No. 14. Repair of Bone in Domestic Fowl.

No. 16. Clover Stem Rot.

No. 17. The Limits in Hybridization of Vitis Rotundifolia with Related Species and Genera.

No. 18. Some F-1 Hybirds of Vitis Rotundifolia with Related Species and Genera.

No. 20. Studies on the Physiology of Some Plant Pathogenic Bacteria.

No. 21. The Gloomy Scale.

No. 23. Hybridization of Vitis Rotundifolia.

No. 24. Nitrification and Acidity in the Muck Soils of North Carolina.

No. 25. Major Plant Communities.

No. 26. Studies in Treatment of Cotton Seed.

No. 28. Leaf Scorch Diseases of Strawberries.

No. 29. Bacillary White Diarrhea.

No. 30. The Toxicity to Cotton Seedlings of High Concentrations of Soluble Nitrogenous Fertilizers.

No. 31. Infectious Purulent Entero-Proventriculitis of Fowls.

No. 32. A Southern Upland Grass-Sedge Bog (An Ecological Study).

No. 33. Method for Measuring the Drag of Cotton Fibers.

No. 34. Agglutination and Pathological Studies in Bacillary White Diarrhea.

No. 35. A Chemical Control for Sweet Potato Wilt or Stem Rot.

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The following farmers attended the meeting at which the program was prepared and adopted, and rendered valuable assistance in its preparation:

Alamance County—J. E. Sellars, Route 3, Mebane, N. C.; W. P. Ireland, Elon College, N. C.; Joe Nicholson, Saxapahaw, N. C.; D. M. Anderson, Route 5, Burlington, N. C.; N. A. Kimrey, Mebane, N. C.; H. S. Scott, Haw River, N. C.

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Beaufort County—F. P. Latham, Belhaven, N. C.

Bertie County—R. A. Holloman, Aulander, N. C.

Bladen County—J. A. Melvin, Parkersburg, N. C.; E. L. Greene, Clarkton, N. C.; O. P. Hilburn, Council, N. C.

Brunswick County—G. R. Foulks, Winnabow, N. C.

Burke County—M. R. Rudisill, Henry River, N. C.

Cabarrus County—H. E. Bonds, Route 1, Concord, N. C.; George E. Faggert, Concord, N. C.

Caldwell County—R. W. Greene, Kings Creek, N. C.

Camden County—H. C. Farabee, Camden, N. C.

Catawba County—E. L. Moore, Route 2, Conover, N. C.; C. H. Herman, Route 1, Conover, N. C.; H. P. Lutz, Newton, N. C.

Carteret County—G. W. Huntley, Beaufort, N. C.; G. W. Ball, Newport, N. C.

Chatham County—W. H. Ferguson, Route 2, Pittsboro, N. C.

Chowan County—T. C. Byrum, Edenton, N. C.; R. C. Holland, Edenton, N. C.

Davidson County—M. L. Aderholt, Route 4, Lexington, N. C.; Roy Lohr, Route 2, Lexington, N. C.

Duplin County—D. H. Boney, Teachey, N. C.; J. R. Croon, Magnolia, N. C.

Durham County—W. W. Fletcher, Route 6, Durham, N. C.; R. H. Shaw, Route 8, Durham, N. C.; J. T. Hicks, Route 6, Durham, N. C.; W. M. Bacon, R. F. D., Stem, N. C.

Edgecombe County—B. B. Howell, Tarboro, N. C.; Henry Britt, Route 5, Tarboro, N. C.

Forsyth County—R. F. Linville, Route 4, Kernersville, N. C.

Franklin County—H. F. Mitchell, Route 1, Kittrell, N. C.

Gates County—R. E. Morgan, Corapeake, N. C.

Granville County—B. F. Dean, Oxford, N. C.

Guilford County—R. F. Shaw, Route 5, Greensboro, N. C.

Halifax County—J. A. White, Littleton, N. C.

Harnett County—Eugene Smith, Dunn, N. C.; J. C. Browne, R. F. D., Lillington, N. C.; K. F. Howard, Dunn, N. C.

Hertford County—R. C. Mason, Harrellsville, N. C.

Haywood County—C. A. Black, Waynesville, N. C.

Henderson County—L. L. Burgin, Route 1, Horse Shoe, N. C.; Robert Rawls, Hendersonville, N. C.; L. H. McKay, Hendersonville, N. C.

Hoke County—E. B. Garrett, Sanatorium, N. C.; W. T. Covington, Raeford, N. C.; J. D. Mason, Raeford, N. C.

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Jones County—Edgar Philyew, Comfort, N. C.

Lee County—B. B. Watson, Route 1, Jonesboro, N. C.; J. M. Wilcox, Carbonton, N. C.

Lenoir County—Norman West, Route 6, Kinston, N. C.; L. O. Mosley, Route 2, Kinston, N. C.; W. C. Worthington, Grifton, N. C.

Lincoln County—George Wise, Route 1, Lincolnton, N. C.; T. A. Warlick, Lincolnton, N. C.

Montgomery County—A. J. Lowdermilk, Mt. Gilead, N. C.; M. A. Bennett, Jackson Springs, N. C.; R. R. Auman, Steeds, N. C.

Moore County—L. T. Graham, Jackson Springs, N. C.; John Wilcox, Carbonton, N. C.; D. A. L. Blue, Carthage, N. C.; C. A. Hunter, Cameron, N. C.

Nash County—M. F. Morgan, Bailey, N. C.

New Hanover County—A. Ludeke, Castle Hayne, N. C.

Northampton County—W. D. Barbee, Seaboard, N. C.

Orange County—E. S. Vannatta, University, N. C.

Pamlico County—H. D. Potter, Cash Corner, N. C.; J. B. Holton, Route 1, New Bern, N. C.; E. D. Lee, Grantsboro, N. C.

Pasquotank County—J. W. Foreman, Elizabeth City, N. C.; H. C. Meads, Route 1, Weeksville, N. C.

Pender County—S. G. Hayes, Rocky Point, N. C.

Perquimans County—W. C. Chappell, Belvidere, N. C.; John O. White, R. F. D., Hertford, N. C.

Person County—J. Y. Humphries, Woodsdale, N. C.

Randolph County—E. C. Byrd, Route 1, Ramseur, N. C.; J. N. Kearns, Farmer, N. C.; Charles E. Kearns, Route 2, Asheboro, N. C.

Richmond County—Mrs. B. F. Palmer, Rockingham, N. C.; F. I. Mason, Rockingham, N. C.

Robeson County—John McArthur, Wakulla, N. C.; M. Shephard, Orrum, N. C.

Rowan County—Ira Bailey, Woodlead, N. C.

Stanly County—R. A. Lipe, Route 1, Richfield, N. C.; Ellis Burris, Route 4, Albemarle, N. C.

Surry County—Ruohs Pyron, Elkin, N. C.

Union County—V. W. Williams, Wingate, N. C.; A. M. Sechrest, Monroe, N. C.; S. A. Latham, Route 4, Monroe, N. C.

Vance County—J. E. Kimball, Townsville, N. C.; P. H. Gill, Route 4, Henderson, N. C.

Wake County—L. Y. Ballentine, Varina, N. C.; Dr. J. R. Lowery, Raleigh, N. C.; H. H. Blaylock, Cary, N. C.; John Harden, Raleigh, N. C.; C. H. Chamblee, Zebulon, N. C.

Warren County—James Frazier, Warren Plains, N. C.

Washington County—L. E. Hassell, Roper, N. C.